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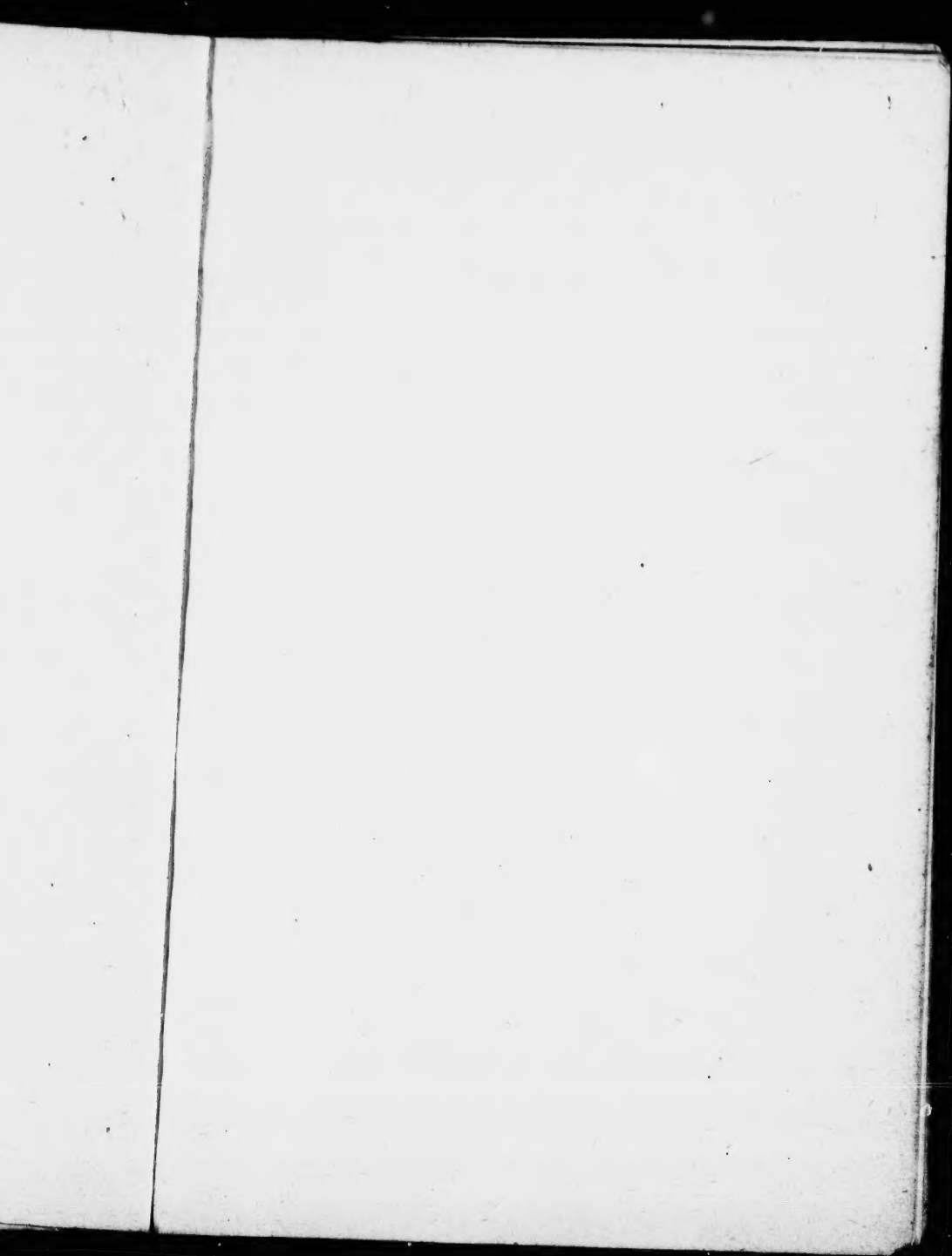
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GRAFTON'S
GRADED ARITHMETIC

BOOK II.

BY
E. W. ARTHY,
Superintendent of Public Schools, Montreal.

REVISED EDITION.

Authorized for use in the Province of Quebec.

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F. E. GRAFTON & SONS, PUBLISHERS,
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NOTE TO TEACHERS.

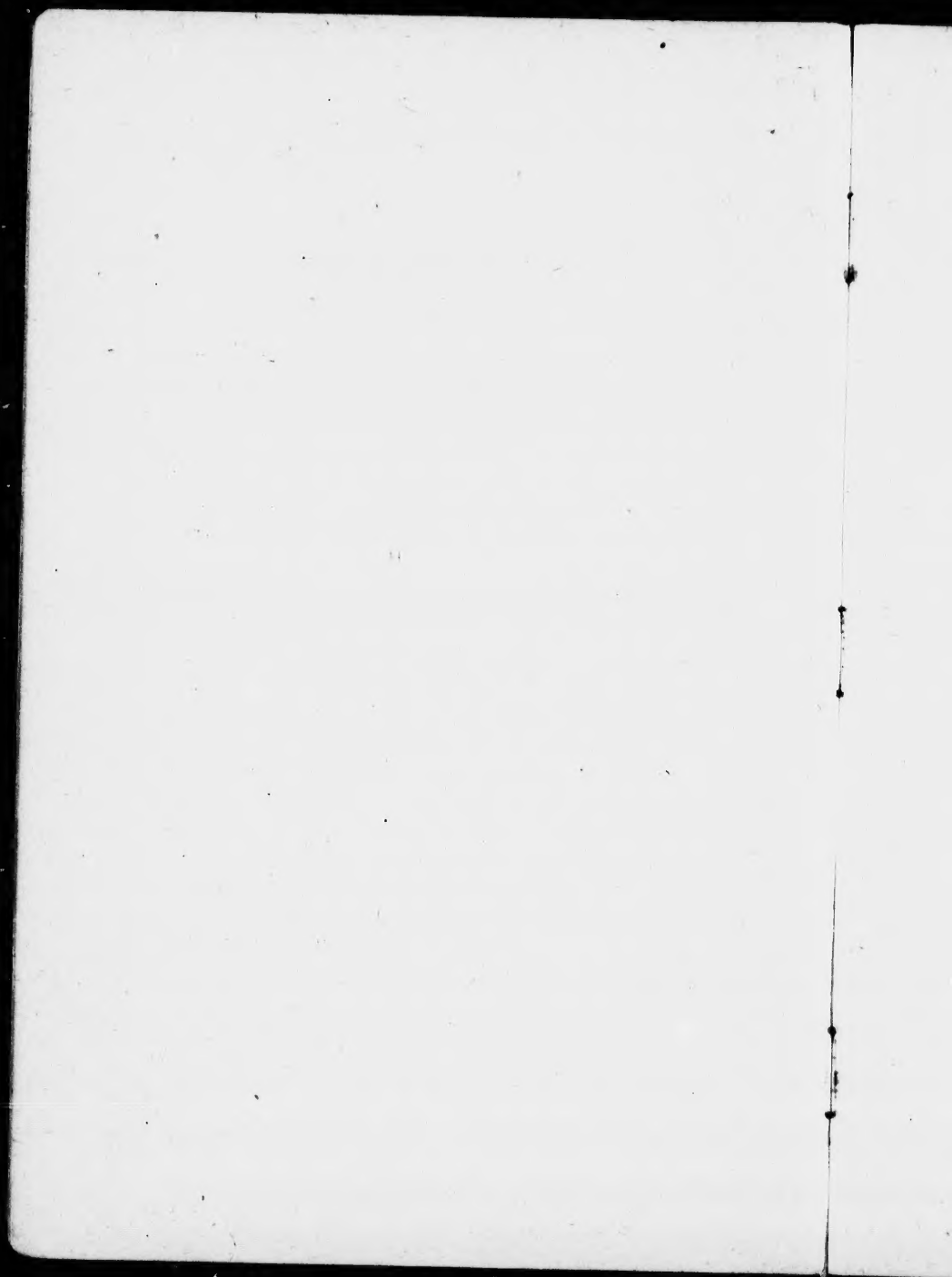
This collection of exercises has been arranged and compiled for the use of beginners. It is intended to furnish a sufficient number of easy and easily graded examples. It has been prepared for inductive teaching. All new work is introduced by easy sight examples, the object being to lead to an almost unaided perception of processes and principles. Too often young pupils have to grapple with numerical difficulties when attempting to grasp a new principle.

Before taking up a new exercise, study its plan and the best method of presenting it to the class. Then begin with the oral exercises. In oral exercises, the pupils may solve the problems aloud, or may perform the solutions silently and record the answers on slate or paper. Little should be taught. Pupils, as far as possible, should be led to acquire knowledge by their own efforts.

Many of the problems are new; others have been collected at various times during the past twenty years from sources too numerous to specify.

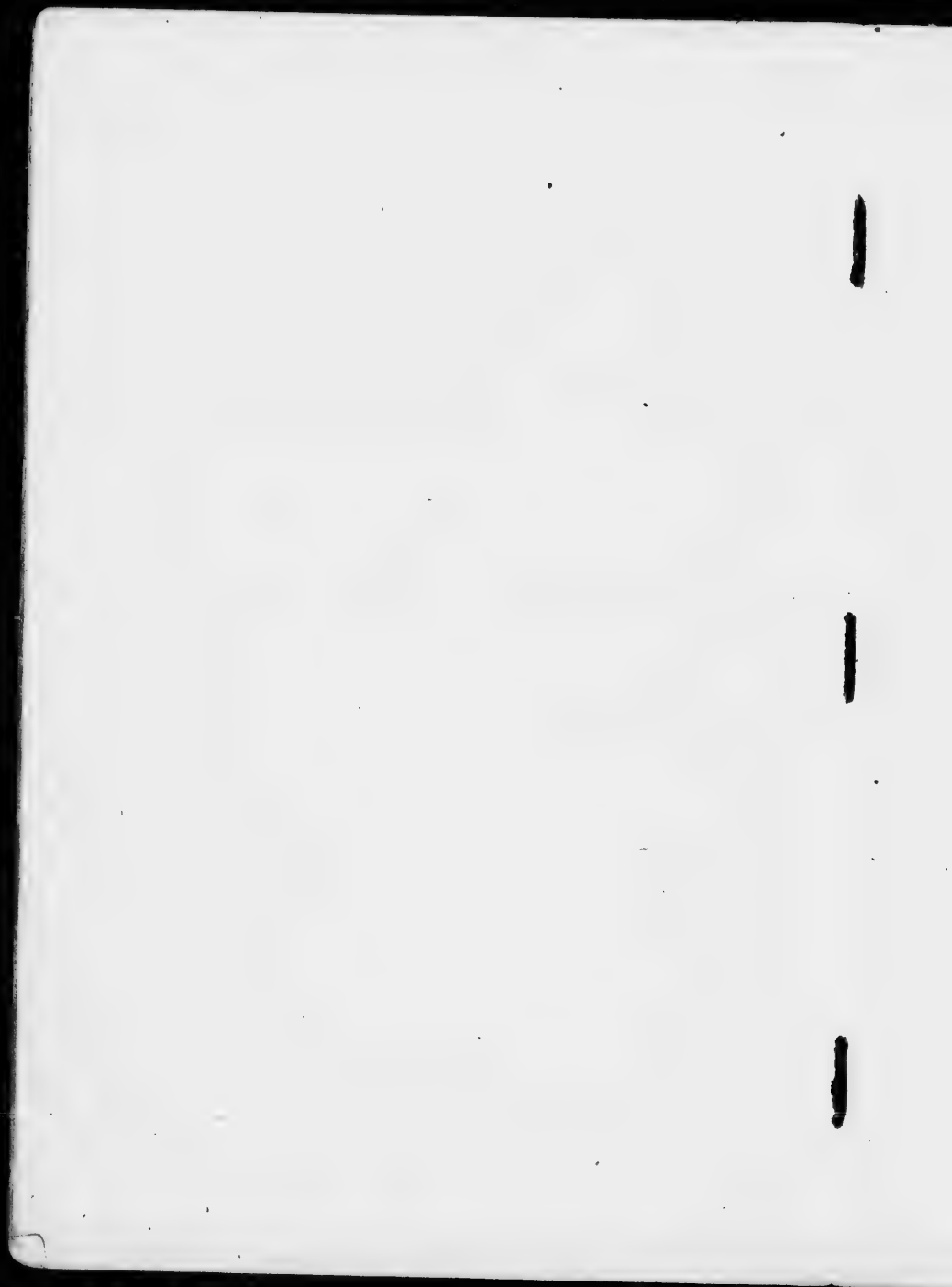
A **Teachers' Manual**, giving full directions in using this book, as well as **Answers** to problems, may be procured from the Publishers. Price, 35 cents net.

Suggestions or corrections will be gratefully received either by the Author or the Publishers.



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CHAPTER I. CANADIAN MONEY.

100 CENTS = \$1.

Read, fill in and commit to memory:—

A

$\frac{1}{2}$ of \$1 = — cents.

$\frac{1}{4}$ of \$1 = 25 cents.

$\frac{3}{4}$ of \$1 = 75 cents.

$\frac{1}{10}$ of \$1 = 10 cents.

$\frac{1}{2}$ of \$1 = 50 cents.

$\frac{1}{4}$ of \$1 = 25 cents.

$\frac{1}{10}$ of \$1 = 10 cents.

B

50 cents = $\frac{1}{2}$ of \$1.

25 cents = $\frac{1}{4}$ of \$1.

75 cents = $\frac{3}{4}$ of \$1.

20 cents = $\frac{2}{10}$ of \$1.

10 cents = $\frac{1}{10}$ of \$1.

33 $\frac{1}{3}$ cents = $\frac{1}{3}$ of \$1.

12 $\frac{1}{2}$ cents = $\frac{1}{8}$ of \$1.

I.

1. Name the Canadian copper coin; the four silver coins.

2. I have one of each of these coins in my pocket; how much money have I?

3. How many fifty-cent pieces are there in \$1? In \$1.50? In \$2? In \$3? In \$4.50? In \$7.50? In \$9.50? In \$10?

4. How many twenty-five-cent pieces are there in 50 cents? In 75 cents? In \$1? In \$2? In \$1.25? In \$2.75? In \$5? In \$7.50?

5. How many *quarters* are there in 75 cents? In \$1? In \$1.75? In \$2.25? In \$6? In \$6.50? In \$7.75?

6. How many twenty-cents make \$1? \$2? 40 cents? 80 cents? \$1.20? \$2.60? \$3? \$3.80?

7. How many ten-cent pieces are there in half-a-dollar? In \$1? In \$1.50? In \$1.60? In \$2? In \$2.20? In \$2.30? In \$2.50?

8. How many five-cent pieces are there in 10 cents? In 15 cents? In 25 cents? In a quarter? In half-a-dollar? In $\frac{3}{4}$ of a dollar? In \$1?

9. How often is $12\frac{1}{2}$ cents contained in a quarter? In half-a-dollar? In $\frac{3}{4}$ of a dollar? In one dollar? In \$1.50? In \$2? In \$2.25?

10. How often is $33\frac{1}{3}$ cents contained in \$1? In \$2? In \$3? In \$5? In \$20?

11. Find the sum of:—

- (a) 3 quarters and 2 half-dollars.
- (b) 4 ten-cent pieces and 3 five-cent pieces.
- (c) 6 twenty-cent pieces and 5 quarters.
- (d) $\$1$ and $\$3$.
- (e) $\$1$ and $\$10$.
- (f) $\$1$, $\$1$, $\$1$, $\$3$.

II.

A

Read (or write in words):—

\$3.00	\$9.09	\$37.00	\$8.00	\$0.17	\$502.00
\$2.03	\$0.10	\$26.90	\$6.00	\$0.08	\$654.79
\$0.01	\$0.09	\$ 5.00	\$5.02	\$0.76	\$6001.53

B

Write in figures:—

1. Fifty thousand dollars.
2. One thousand and one dollars eighty-seven cents.
3. Eighty-four dollars sixty cents.
4. Six dollars six cents.
5. Three dollars; seventeen dollars; five dollars fifty cents.
6. Three cents; ten cents one cent; fifty-five cents.

III.

1. How many cents are there in \$1? In \$2? In \$5?
2. How many cents are there in \$1.05? In \$1.75? In \$2.12? In \$5.01?

3. Express as cents:—

\$27.14	\$8.67	\$4.76	\$706.94	\$3172.50	\$1000.00
\$10.00	\$10.00	\$1.00	\$7.00	\$20.20	\$2020.00

4. Express as dollars and cents:—

990 cents.	397 cents.	7077 cents.
407 cents.	300 cents.	400507 cents.
100 cents.	475 cents.	182010 cents.

IV. (Oral.)

1. Add \$9, \$11, \$5, \$4, \$7.
2. How much less is \$0.15 than \$0.07 + \$0.08 + \$0.06?
3. What is the sum of \$0.50 and \$0.58?

4. Add \$0.45 and \$0.55.
5. From \$100 take each of the following: \$18, \$24, \$53, \$86, \$37, \$29, \$31, \$23.
6. From one dollar take each of the following: 26 cents, 93 cents, 27 cents, 36 cents, 75 cents, 18 cents, 41 cents.
7. What change shall I get from \$1 in paying a bill of \$0.39? \$0.77? \$0.65? \$0.88? \$0.22? \$0.66? \$0.53? \$0.98? \$0.09?
8. I spend 12 cents, 4 cents, 6 cents, 2 cents and 3 cents out of \$1. What have I left?
9. I give \$0.10 for a slate, \$0.08 for a copy-book, \$0.07 for an exercise-book, \$0.05 for a lead pencil, and offer a dollar bill in payment. How much should I get back?

V.

1. Add sixty cents; one dollar seventy-five cents; ninety cents; six cents; one dollar four cents; two dollars forty cents.
2. Find the sum of forty-eight cents; sixteen dollars; fifteen dollars thirty-seven cents; eight cents; eighteen dollars eighteen cents.
3. $\$479.63 + \$15\ 98 + \$263.16 + \$547.92 + \$8.19$.
4. $\$5029.87 + \$670.64 + \$2135.46 + \$7961.01 + \$3.14 + \$769.72 + \$76972$.
5. Find the difference between nineteen thousand dollars and one hundred thousand dollars.
6. From nine thousand and ninety dollars nine cents take eight thousand and nineteen dollars nineteen cents.
7. From one million dollars subtract one thousand and seven dollars fifty-three cents.
8. $\$2,140,000 - \$945,076.89$.

VI. (*Oral.*)

1. From \$34 take the sum of \$25 and \$3.
2. To \$.30 add the difference between \$.25 and \$.08.
3. To the sum of \$13 and \$8 add the difference between \$17 and \$5.
4. To \$.06 add the sum of \$.03, \$.04 and \$.05.
5. To \$13 add the sum of \$6 and \$5, and from the result take \$8.
6. Value of \$15 + \$25 - \$21.
7. From \$.42 take \$.05 + \$.09 + \$.08 + \$.06.
8. Value of \$.12 - \$.05 + \$.07 + \$.19.

VII. (*Oral.*)

Find the cost of:—

1. 2 hats at 40 cents apiece.
2. 7 lbs. sugar at 6 cents a lb.
3. 2 pairs kid boots at \$1.25 a pair.
4. 3 hams, each 10 lbs., at 10 cents a lb.
5. 30 oranges at 20 cents a dozen.
6. 6 dozen apples at one cent each.
7. 2 tins lunch biscuits, each 8 lbs., at 10 cents a lb.
8. 500 boxes matches at \$12 a hundred.
9. 120 eggs at 13 cents a dozen.
10. 10 geese at \$1.50 a couple.
11. 45 yards calico at 5 cents a yard.
12. 3 pairs boots at \$2.50 a pair?
13. 650 apples at a cent each.
14. 6 ducks at 33½ each.

VIII.

Find the cost of:—

1. 7 dozen eggs at \$.17 a dozen.
2. 15 lbs. of cheese at \$.14 a lb.

3. 8 baskets at \$0.75 each.
4. 17 barrels flour at \$13 a barrel.
5. 9 dozen towels at \$4.45 a dozen.
6. 30 gallons paint at \$1.35 a gallon.
7. 3 chairs at \$2.75 each.
8. 11 mirrors at \$6.95 each.
9. 257 oxen at \$85 a head.
10. 19 baskets penches at \$1.44 a basket.
11. 64 bushels wheat at \$0.86 a bushel.
12. 1737 lbs. ice at \$0.01 a lb.

IX.

Find the amount of the following bills:—

1. 25 yards red ribbon at 9 cents; 13 yards velvet at 42 cents; 18 yards lace at \$1.45; 3 dozen hats at 13 cents each.
2. 7 lbs. steak at 11 cents; 19 lbs. mutton at 9 cents; 5 hams, each 12 lbs., at 16 cents; 16 lbs. veal at 12 cents.
3. 3 pairs boots at \$4.25 a pair; 5 dozen laces at 2 cents apiece; 2 pairs slippers at 85 cents a pair; repairing 2 pairs boots, 65 cents and \$1.10.
4. 3 cakes, each 3 lbs., at 12 cents a lb.; 7 cakes, each 2 lbs., at 15 cents a lb.; 9 tins biscuits, each 7 lbs., at 13 cents a lb.; 196 tarts at 3 cents.
5. 16 quarts milk at 7 cents; 108 eggs at 9 cents a dozen; 17 lbs. butter at 19 cents; 120 lbs. potatoes at \$0.01.
6. 7 dozen penholders at 13 cents a dozen; 19 quires paper at 23 cents; 900 envelopes at 35 cents a hundred; 8 dozen slate pencils at 12½ cents a dozen.
7. 6 sewing machines at \$27 each; 5 perambulators at \$34.50 each; 11 packing cases at 80 cents each; freight, \$3.75.

8. 11 chests tea, each 29 lbs., at 50 cents; 1 barrel molasses, 200 lbs., at 2 cents; 12 boxes raisins at \$6.35; 250 lbs. rice at 4 cents.

9. 30 fowls at 65 cents a couple; 20 turkeys, each 10 lbs., at 10 cents a lb.; 50 rabbits at 35 cents a pair; 4 dozen partridges at 50 cents a brace.

X. (Oral.)

1. How many lbs. sugar at 6 cents can I buy for 30 cents? For 54 cents? For 96 cents? For \$1.26?

2. How many books at 25 cents can I buy for 50 cents? For 75 cents? For \$1.25?

3. John spent a dollar for pictures; at 5 cents each how many did he buy?

4. How many times is

7 cents contained in \$.028? \$.03 contained in \$.027?

9 " " " \$.063? \$.13.00 " " \$39.00?

12½ " " " \$1.00? \$.012 " " \$.084?

33⅓ " " " \$1.00? \$.025 " " \$.275?

4 " " " \$1.60? \$.050 " " \$.950?

5. At 5 cents each, how many oranges can be bought for 30 cents? For \$1.00? For \$1.50?

6. At \$4 a yard, how many yards of silk can be bought for \$20? For \$40? For \$64? For \$96?

7. At 11 cents each, how many articles can be bought for 77 cents? For \$1.10? For \$1.32? For \$2.42?

XI. (Oral.)

1. If 5 pencils cost 30 cents, what will one cost?

2. If 4 yards silk cost \$36, what is the price per yard?

3. A horse trots 72 miles in 8 hours; at what rate is that per hour?

4. A steamboat runs 132 miles in 11 hours; how many miles an hour does it run?

5. If 48 bushels are contained in 12 bags, how many bushels will one bag hold?

6. When 21 barrels of apples can be bought for \$63, what will a barrel cost?

7. Find the cost of one article if

4 cost 36 cents.	9 cost \$1.08.
3 cost 75 cents.	6 cost \$2.46.
12 cost 84 cents.	3 cost \$3.15.
13 cost 39 cents.	5 cost \$5.50.
11 cost 99 cents.	10 cost \$8.30.

XII.

A

Find the price of one article if

- | | |
|--------------------|----------------------|
| 1. 25 cost \$4.25. | 6. 28 cost \$ 4.48. |
| 2. 18 cost \$6.30. | 7. 42 cost \$63.00. |
| 3. 15 cost \$2.85 | 8. 36 cost \$ 9.00. |
| 4. 17 cost \$5.10. | 9. 124 cost \$93.00. |
| 5. 13 cost \$3.51. | 10. 75 cost \$ 9.00. |

B

How many articles at

- \$0.16 can be bought for \$6.24?
- \$0.17 can be bought for \$9.52?
- \$0.09 can be bought for \$8.64?
- \$3.25 can be bought for \$19.50?
- \$2.48 can be bought for \$19.84?
- \$1.73 can be bought for \$519?
- \$6.49 can be bought for \$29,769.63?
- \$1.44 can be bought for \$54,000?

XIII. (Oral.)

1. How much is $\frac{1}{2}$ of 10? Of 15? Of 20? Of \$25?
Of \$55? Of 60 lbs.?
2. How much is $\frac{2}{3}$ of 10? Of 15? Of \$20? Of 50?
3. How much is $\frac{1}{4}$ of 14? $\frac{3}{4}$ of \$14? $\frac{2}{3}$ of \$21?
4. How much is $\frac{1}{5}$ of 9? $\frac{4}{5}$ of 9 horses? $\frac{1}{4}$ of 63?
 $\frac{5}{6}$ of \$45? $\frac{1}{6}$ of \$72?
5. How much is $\frac{1}{10}$ of a dollar? $\frac{9}{10}$ of 50 ounces?
 $\frac{7}{10}$ of \$110?
6. How much is $\frac{1}{12}$ of 108? $\frac{3}{12}$? $\frac{5}{12}$? $\frac{7}{12}$? $\frac{11}{12}$?
7. How much is $\frac{2}{3}$ of 84 cents? Of 63 cents? Of 28 cents? Of \$42?
8. How much is $\frac{7}{9}$ of 63 cents? Of 99 cents? Of \$1.08? Of 72 cents?
9. How much is $\frac{1}{3}$ of \$1? $\frac{2}{3}$ of 100 cents? $\frac{2}{3}$ of 100?
10. How much is $\frac{1}{4}$ of \$1? $\frac{3}{4}$ of 100 cents? $\frac{1}{8}$ of 100 ounces? $\frac{3}{8}$ of 100? $\frac{5}{8}$ of \$1? $\frac{1}{8}$ of \$1?

XIV. (Oral.)**A**

1. If 4 lbs. of coffee cost 80 cents, what will 1 lb. cost?
2. If 4 lbs. of coffee cost 80 cents, what will 2 lbs. cost? 3 lbs.? 8 lbs.?
3. If 8 lbs. of sugar cost 48 cents, what will 3 lbs. cost? 7 lbs.? 9 lbs.?
4. If 4 yds. of cloth cost \$1.60, what will 7 yds. cost?
5. If 7 sheep cost \$35, what will 12 sheep cost?
6. Cost of 120 oranges at 12 cents for 4?
7. Cost of 12 ounces of candy at 9 cents for 3 ounces?
8. If 5 horses plough 15 acres in a day, how many acres will 11 horses plough?

B

1. If 10 men plough a field in 8 days, how long will it take 1 man?
2. If 2 men do a piece of work in 20 days, how long will it take 5 men? 8 men? 10 men?
3. If a field contains pasture for 12 oxen for 6 days, how long will it serve 6 oxen? 8 oxen? 9 oxen?
4. If a field will keep 7 horses for 6 weeks, how long will it keep twice that number of horses? 3 times that number of horses? Half that number of horses?

C

1. Cost of 60 slate pencils at 5 cents for 20?
2. Cost of 5 dozen laces at 5 cents for 6?
3. Cost of 30 oranges at 5 cents for 3?
4. Cost of 2 dozen ducks at 3 for \$1?
5. Cost of 42 sponge cakes at 6 cents for 7?
6. Cost of 63 lbs. of rice at 7 lbs. for \$1?
7. Cost of $3\frac{1}{2}$ doz. pine apples at 80 cents the $\frac{1}{2}$ doz.?
8. Cost of 4 waterproofs at \$48 for 16?
9. Cost of 20 combs at \$6 a hundred?
10. Cost of 98 cakes at 10 cents for 14?

XV.

1. If 14 tons of coal cost \$84, what will 17 tons cost?
2. If 70 lbs. of tea cost \$29.40, what will 67 lbs. cost?
3. If a train goes 109 miles in 327 minutes, how long will it take to go from Montreal to Toronto, a distance of 333 miles?
4. If 42 acres rent for \$63, what will be the rent of 97 acres?
5. If 5 horses can plough 75 acres in a week, how many acres can 28 horses plough?

6. If 27 yards of calico cost \$4.05, what will 113 yards cost?

7. If 24 men can mow a field in 9 days, how many men can mow it in 3 days?

8. If a certain quantity of corn will feed 6 horses for 33 days, how long will the same quantity feed 22 horses?

9. If a man walks 198 feet in 33 steps, how many feet will he walk in 42 steps?

10. If 23 loaves weigh 92 lbs., what will 17 loaves weigh?

11. If 80 pigs cost \$360, what will 67 pigs cost?

REVIEW.

1. Twenty-seven thousand and eight + three thousand and nineteen + seventy-seven thousand and ten + eight hundred and seventy-three + fifty thousand nine hundred and seven + twelve thousand two hundred and ninety-six + eighty thousand + eighteen hundred and seventeen.

2. *Subtract* three million three thousand five hundred and seventeen *from* seven million six hundred and two thousand five hundred and eighty.

3. *Multiply* seven hundred and eighty-nine thousand six hundred and fifty-eight *by* seven thousand and ninety-eight.

4. *Divide* three million forty thousand and nine *by* thirty-seven.

5. A purse and the money in it together are worth sixteen dollars and ninety-five cents; there are in it two five-dollar bills, three one-dollar bills, three quarters, one half-dollar and nine ten-cent pieces. How much is the purse worth?

6. Five sisters have each five hens, and each hen lays five eggs a week. (a) How many eggs will they get in a year (52 weeks)? (b) How much money will they get if they sell the eggs at one cent each? At 18 cents a score? At 75 cents a hundred?
7. A man started on a railway journey with \$14.85 in his pocket; he paid away \$3.87 for railway fares, \$5.45 for hotel expenses, and \$2.13 for other expenses. How much had he left?
8. I give you \$1 to pay a bill of \$0.62, and you give me my change in quarters, ten-cent pieces and cent pieces. How many of each will you give me?
9. What must be added to \$659.07 to make it a thousand dollars?
10. How often is 11 cents contained in \$132?
11. Find the amount of 15 quires foolscap at \$0.11; 25 quires writing-paper at \$0.09; 20 bottles of ink at 5 bottles for \$0.12; 26 account books at \$0.07; 4 other blank books at \$0.45, \$0.63, \$0.25 and \$0.54 respectively.
12. If I can read 36 pages in 108 minutes, how many minutes will it take to read a book containing 350 pages?
13. A man bought 137 cows at \$35 a head, and sold 94 of them at \$37 a head and the rest at \$34 a head. What did he gain?
14. A man earned \$11.76 during the first week of a month; \$7.73 during the second; \$8.49 during the third; \$6.38 during the fourth. (a) How much did he earn during the four weeks? (b) How much more did he earn the first week than the second? (c) How much more during the second than the fourth?
15. I bought goods for \$8.82, giving two five-dollar bills in payment. Give me my change in half-dollars, five-cent pieces and cents.

16. \$37625.05 was divided equally among a certain number of men; each man got \$7.85. How many men were there?

17. I go out with \$100. What have I left after buying 9 chairs at \$8.75 each?

18. If 4 men dig a well in 12 days, how long will 6 men take?

19. Amount of 14 yards calico at 13 cents; 22 yards carpet at \$1.96; 2 rugs at \$19.85 and \$27.35?

20. Divide \$348,000 by 49 in two short divisions. Prove the result.

21. If I can copy a letter 15 times in an hour, how long will it take to copy it 75 times?

22. The quotient is \$2.95 and the divisor is 322. Find the dividend.

23. One man has in his purse 17 ten-dollar bills, 13 one-dollar bills and 15 ten-cent pieces. Another man has 27 five-dollar bills, 11 one-dollar bills, 3 half-dollars, 5 quarters, 6 five-cent pieces and 9 cents. How much more has one man than the other?

24. Find $\frac{5}{11}$ of \$1254.

25. At \$8.17 a ton, how many tons of coal can be bought for \$1000, and how much money will be left over?

26. A man divided a sum of money into 19 equal parts; each part was \$11.85 and \$5 was left over. Find the sum.

27. In a certain class of 37 scholars each boy was given half-a-dollar, a quarter and a ten-cent piece. How much money was required?

28. How much money had I, if, after buying 35 hens at \$0.65 each, I have \$17.25 left?

29. How many hens at 45 cents each can I buy, so as to have \$8.80 left out of \$70?

30. A man sold 19 dozen eggs at 26 cents a dozen; 25 lbs. butter at 36 cents a lb.; and 17 geese at half-a-dollar each. He bought 17 lbs. tea at \$0.60. How much money had he left?

31. A collection in church consisted of 17 five-dollar bills, 11 two-dollar bills, 85 dollar bills, 103 half-dollars, 67 quarters, 90 twenty-cent pieces, 50 ten-cent pieces, 73 five-cent pieces and 18 cents. What was the amount of the collection?

32. I bought 14 yards of silk at \$3.35 a yard, and received in change \$3.90 out of a fifty-dollar bill. What mistake was there in the change?

33. Find (a) the sum of, (b) the difference between, (c) the product of 411 and 114. Divide the product by the difference.

34. How many dozen eggs at \$0.19 a dozen will be required to pay for a horse costing \$47.50?

35. If some provisions last 84 men 28 weeks, for how many weeks will they last 48 men?

36. If \$567 will buy 126 sheep, how many sheep can be bought for \$565?

37. Three hundred and six thousand four hundred and seventy-five + twenty-nine thousand + five hundred and sixteen thousand eight hundred and ninety-two + four thousand seven hundred and eighty-nine + eight hundred and nine thousand three hundred and forty-one + ninety-eight thousand and thirty + nine hundred thousand and four.

38. From forty million thirty thousand and twenty-seven *subtract* seven million six hundred and twenty thousand nine hundred and fifty.

39. *Multiply* two million ninety-six thousand seven hundred and fifty-eight *by* three thousand and eighty-nine.

40. *Divide* six hundred and eighty-nine million seven hundred and fifty-one thousand eight hundred and seventy nine *by* fifty-six (in two short divisions).

REVIEW EXERCISES. (*Mental.*)

1. How many quarters in \$4.50?
2. How many ten-cent pieces in \$2.80?
3. How many five-cent pieces in \$1.65?
4. $\$0.67 + \$0.18 + \$0.25$?
5. From \$1 take the price of 4 lbs sugar at 7 cents.
6. At 12 cents each, what will 9 tops cost?
7. If 6 men can mow a field in 12 hours, how long will it take one man to do it?
8. A man earns \$40 a month and spends \$33. How much will he save in a year?
9. A farmer sold 5 pigs at \$11 each, and 20 hens at 25 cents each. How much did he get?
10. At \$15 an acre, how much land can be bought for \$300?
11. Bought goods for \$3.25 and gave \$5 in payment. What change?
12. Bought goods for \$8.38 and gave \$10 in payment. What change?
13. $\frac{9}{16}$ of \$2?
14. $\frac{1}{16}$ of a dollar is how many cents more than $\frac{3}{8}$ of a dollar?
15. Cost of 4 books at $12\frac{1}{2}$ cents each?
16. How many books at $12\frac{1}{2}$ cents each can be bought for \$1.50?
17. Which would you rather have, $\frac{3}{4}$ or $\frac{1}{2}$ of a dollar?
18. A carpenter, charged \$2.40 for a day's work of 8 hours. How much an hour?

19. How many books at $33\frac{1}{2}$ cents can be bought for \$2?
20. After paying, for 3 pairs of gloves at 90 cents a pair, I have 80 cents left. How much had I?
21. Cost of 108 candles at 9 cents a dozen?
22. If a clock gains 48 seconds in 4 hours, what will it gain in a day (12 hours)?
23. Cost of 35 apples at 7 for 4 cents?
24. In 15 five-cent pieces how many quarters?
25. Bought 6 tons of coal at \$6 a ton, and paid for it with apples at \$3 a barrel. How many barrels did it take?
26. I received 8 weeks' board for 6 tons of hay worth \$12 a ton. What did I pay a week for board?
27. Take 7 times 8 from 9 times 9.
28. To how many boys could I give 5 cents out of 65 cents?
29. From what sum can 15 cents be taken six times?
30. 19 times 25 cents?
31. 6 dozen oranges cost \$0.72. How much apiece?
32. A newsboy bought 60 papers at 2 cents each, and sold them at 3 cents each. What did he gain?
33. My reader cost $\frac{5}{9}$ of 63 cents. How much?
34. Multiply \$2.50 by 4.
35. How often is \$0.04 contained in \$1?
36. Cost of 7 plates at 37 cents?
37. Divide \$6.24 by 6.
38. Divide \$9 into 12 equal parts.
39. Add \$8.08 and \$1.24.
40. At 15 cents a quire, how many quires can I buy for \$1.50?
41. 20 boxes of matches at 4 for 5 cents?
42. What is $\frac{1}{4}$ of 100?
43. A girl carried 5 dozen eggs; broke $\frac{3}{10}$ of them. How many were broken?

44. Bought 6 yards cloth at 60 cents. Give me change out of \$5.

45. If I walk 15 miles in 5 hours, how far can I walk in 2 hours?

46. How long will it take to count 1000 one-dollar bills at the rate of 100 in 2 minutes?

47. Bought 5 loads hay for \$80. At how much a load must I sell it to gain \$3 a load?

48. A man gave \$8 each to a number of persons, and had \$3 left out of \$75. How many persons were there?

49. The remainder is 5, the dividend 125, and the quotient 12. What is the divisor?

50. The remainder is \$4, the dividend \$148, and the quotient \$12. What is the divisor?

DRILL EXERCISE.

How do you change:—

1. Dollars to cents?
2. Cents to dollars?
3. Dollars to half-dollars?
4. Half-dollars to dollars?
5. Dollars to quarter-dollars?
6. Quarters to dollars?
7. Dollars to twenty-cent pieces?
8. Twenty-cent pieces to dollars?
9. Dollars to ten-cent pieces?
10. Ten-cent pieces to dollars?
11. Dollars to five-cent pieces?
12. Five-cent pieces to dollars?
13. Five-cent pieces to quarters?
14. Quarters to five-cent pieces?
15. Five-cent pieces to ten-cent pieces?
16. Ten-cent pieces to five-cent pieces?

CHAPTER II.

FACTORS, MULTIPLES, H.C.F., L.C.M.

XVI. (*Oral.*)

1. Give six odd numbers.
2. Give six even numbers.
3. Give the odd numbers from 30 to 50.
4. Give the even numbers from 50 to 70.
5. Give six numbers divisible by 3.
6. Give six numbers divisible by 5.
7. Give six numbers divisible by 2.
8. Give six numbers divisible by 10.
9. Which of the following numbers are divisible by 2? By 3? By 5? By 10?—
24, 45, 85, 18, 72, 100, 144, 108, 125, 2160,
28, 51, 68, 52, 71, 840, 165, 112, 715, 4185.

XVII. (*Oral.*)

1. Give six prime numbers.
2. Give six composite numbers.
3. Give the prime numbers from 1 to 30.
4. Give the composite numbers from 40 to 70.
5. Which of the following numbers are prime, and which are composite:—
9, 11, 31, 33, 37, 38, 101, 102, 103, 109,
39, 91, 93, 95, 97, 111, 132, 144, 117, 127?
6. What are the factors (two only in each case) of:—
12, 8, 15, 24, 27, 32, 18, 42, 63, 30,
60, 22, 64, 35, 56, 81, 39, 34, 95, 144?
7. What are the prime factors of the numbers in the above example?

8. What are the prime factors of : —

- | | | | |
|---------|---------|-----------|-----------|
| 1. 360. | 5. 93. | 9. 161. | 13. 999. |
| 2. 156. | 6. 104. | 10. 810. | 14. 803. |
| 3. 51. | 7. 212. | 11. 153. | 15. 5450. |
| 4. 225. | 8. 143. | 12. 1200. | 16. 4095. |

XVIII. (Oral.)

1. Give a factor that is common to 8 and 6; 20 and 25; 7 and 14; 18 and 24; 55 and 121; 26 and 28; 30 and 48; 30 and 60.

2. Give the *highest* factor that is common to each pair of numbers in the above example.

3. Find the H.C.F. of:—

A	B	C	D
12, 15.	27, 36.	21, 27.	26, 39.
50, 79.	84, 63.	40, 48.	6, 8, 12.
48, 60.	77, 121.	54, 81.	15, 20, 30.
40, 80.	56, 72.	36, 42.	6, 24, 36.

XIX. (Oral.)

1. Give six numbers of which 3 is a factor?

2. Give six multiples of 3.

3. Give a common multiple of 3 and 5; 3 and 6; 4 and 6; 4 and 8; 9 and 12; 6 and 10; 7 and 9; 10 and 20; 3, 6, 12; 2, 9, 12.

4. Give the least common multiple of each set of numbers in the above example.

5. Find the L.C.M. of:—

- | | | |
|------------|--------------|-------------------|
| 1. 5, 15. | 5. 5, 13. | 9. 3, 6, 42. |
| 2. 20, 30. | 6. 6, 14. | 10. 4, 6, 9. |
| 3. 10, 15. | 7. 2, 6, 18. | 11. 3, 4, 5, 6. |
| 4. 7, 9. | 8. 2, 5, 7. | 12. 6, 30, 5, 10. |

XX.

Find the L.C.M. of :—

- | | | |
|----------------|----------------|-------------------|
| 1. 14, 21, 42. | 5. 66, 88, 22. | 9. 2, 3, 4, 5, 7. |
| 2. 15, 20, 30. | 6. 26, 52. | 10. 48, 80. |
| 3. 5, 7, 10. | 7. 11, 13. | 11. 63, 90. |
| 4. 2, 5, 6, 7. | 8. 144, 108. | 12. 8, 9, 10, 11. |

DEFINITIONS.

1. What is an *even* number?
Ans. A number that can be divided by 2.
2. In what five figures must all *even* numbers end?
Ans. In 0, 2, 4, 6, 8.
3. What is an *odd* number? In what five figures must all odd numbers end?
4. When is a number divisible by 2?
Ans. When its last digit is *even*.
5. When is a number divisible by 3?
Ans. When the *sum* of its digits is divisible by 3.
6. When is a number divisible by 5?
Ans. When its last digit is 5 or 0.
7. When is a number divisible by 10?
Ans. When its last digit is 0.
8. What is a prime number?
Ans. A prime number is one which has no *factors*.
9. What is a composite number?
10. Why are all even numbers composite?
Ans. Because 2 is a factor of all even numbers.
11. What is a *common factor* of two or more numbers?
Ans. A factor which exactly divides each of two or more numbers.
12. When is a *common factor* the H.C.F.?
Ans. When it is the *highest* number which exactly divides each of the given numbers.

13. What is a *multiple* of a number?

Ans. A *multiple* of any number contains that number an exact number of times.

14. What is a *common multiple* of several numbers?

Ans. One that contains each of the given numbers an exact number of times.

15. What is the L.C.M. of several numbers?

Ans. The *least number* that exactly contains each of the given numbers.

16. When numbers have no common factor, how do you find their L.C.M.?

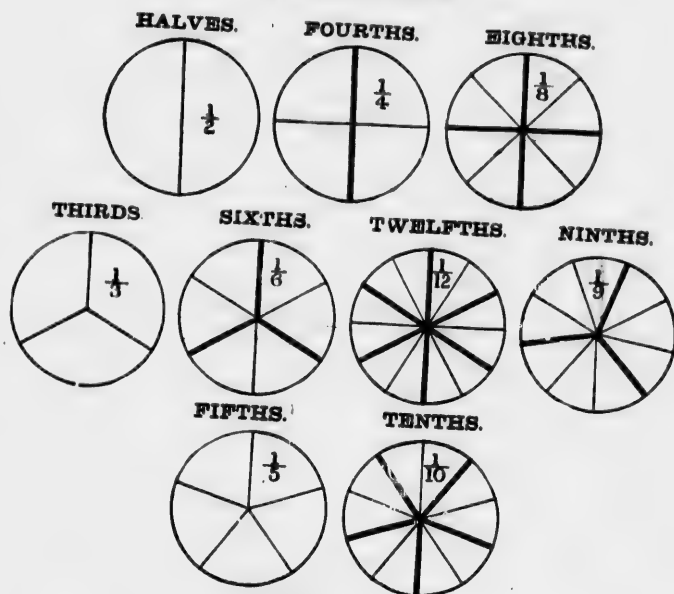
Ans. By finding their continued product.

TEST EXERCISE.

1. Write down the prime numbers from 100 to 110.
2. Write down the composite numbers from 110 to 120.
3. Find at sight the prime factors of 50, 121, 130, 132.
4. Find by inspection the H.C.F. of 55, 66; of 60, 80; of 25, 100.
5. Find the L.C.M. of 8, 12, 16; and of 40, 10, 5, 8.

CHAPTER III.

FRACTIONS



XXII. (Oral.)

A

Express in words and give results:—

- | | | |
|------------------------------------|---------------------------------------|---------------------------------------|
| 1. $\frac{1}{2} + \frac{1}{2} =$ | 8. $\frac{1}{2} = \frac{\quad}{8}$ | 15. $\frac{3}{4} - \frac{1}{2} =$ |
| 2. $1 - \frac{1}{2} =$ | 9. $1 \div \frac{1}{2} =$ | 16. $\frac{1}{4} \times 5 =$ |
| 3. $\frac{1}{4} + \frac{1}{4} =$ | 10. $1\frac{1}{2} \div \frac{1}{2} =$ | 17. $2 \div \frac{1}{4} =$ |
| 4. $\frac{2}{3} + \frac{1}{3} =$ | 11. $\frac{1}{2} \times 2 =$ | 18. $1 - \frac{1}{4} =$ |
| 5. $1 - \frac{2}{3} =$ | 12. $\frac{1}{2} \times 4 =$ | 19. $\frac{3}{8} + \frac{5}{8} =$ |
| 6. $\frac{1}{2} = \frac{\quad}{4}$ | 13. $\frac{1}{2} \times 3 =$ | 20. $\frac{4}{8} + \frac{4}{8} =$ |
| 7. $\frac{2}{3} = \frac{\quad}{6}$ | 14. $\frac{3}{4} - \frac{1}{4} =$ | 21. $1\frac{2}{3} \div \frac{1}{3} =$ |

(Results to be found objectively from the circles.)

B

Express in figures, using the signs $+$, $-$, $\times$, $\div$, $:$

1. *One-fourth* and *two-fourths* make *three-fourths*.
2. *One dollar* less *one-fifth* of a dollar leaves *four-fifths* of a dollar.
3. *Three times one-third* make a whole thing.
4. *One-half* is contained in *two four times*.
5. *Two-ninths* plus *five-ninths* are *seven-ninths*.
6. *Three-sixths* are equal to *one-half*.
7. *One-seventh* taken *three times* is *three-sevenths*.
8. *Half* a cocoanut divided equally among *three* children will give *one-sixth* of a cocoanut to each.
9. *One-twelfth* multiplied by *nine* is *nine-twelfths*.
10. If I cut *one-third* of a pie in *two*, I get *one-sixth* of a pie.

XXIII. (Oral.)

1. By what name do you call the parts when a unit has been broken into:—

- | | |
|----------------|-----------------|
| 2 equal parts? | 6 equal parts? |
| 4 equal parts? | 9 equal parts? |
| 5 equal parts? | 12 equal parts? |

2. Explain the meaning of:—

- | | |
|----------------------------|-----------------------------|
| $\frac{3}{4}$ of a dollar; | $\frac{7}{8}$ of a lb; |
| $\frac{1}{5}$ of an apple; | $\frac{1}{12}$ of a bushel; |
| $\frac{5}{6}$ of a yard; | $\frac{1}{20}$ of a gallon. |

3. I divide a dollar into nine equal parts, and give away four of them. What fraction of the dollar do I give away? What fraction do I keep?

4. A boy walks $\frac{3}{8}$ of a mile. What part of the mile has he left to walk?

5. How many tenths of a dollar make a dollar?
How many fifths of a foot make a foot?
How many sixteenths of a ton make a ton?

XXIV. (*Oral.*)

1. A man can do a piece of work in 2 days. What part of the work can he do in 1 day?
2. A man can do a piece of work in 10 days. What part of it can he do in 1 day? In 2 days? In 7 days? In 9 days? In 10 days?
3. 1 is what part of 2? Of 3? Of 8? Of 12? Of 20?
4. 3 is what part of 6? Of 9? Of 7? Of 11? Of 15? Of 17?
5. 19 is what part of 100? Of 50? Of 30? Of 1000?
6. A day is divided into 24 equal parts, called hours. What part of a day is an hour? 3 hours? 10 hours?
7. An hour is divided into 60 equal parts, called minutes. Express as the fraction of an hour 5 minutes; 15 minutes; 29 minutes; 30 minutes; 60 minutes.
8. You pack eggs in 6 baskets of equal size. What part of the whole number do you pack in one basket? In 3 baskets? In 5 baskets? In 6 baskets?
9. 3 apples are what part of 5 apples? 3 ounces of 5 ounces? 3 of 5?
10. What part of a yard is 1 foot? 2 feet?
What part of a foot is 1 inch? 5 inches?
What part of a quart is 1 pint?
What part of a gallon is 1 quart? 3 quarts?
What part of a peck is 1 quart? 2 quarts?
What part of a lb. is 1 oz.? 6 oz.? 9 oz.?
What part of a week is a day? 3 days?
What part of a year is a month? 11 months?
What part of a year is a day? 100 days?
11. When a unit is divided into seven equal parts, what is the name of one part? Three parts? Five parts?
12. Define *fraction*, *numerator*, *denominator*.

XXV. (Oral.)

1. How many fourths in $1\frac{1}{4}$? In $2\frac{1}{4}$? In $3\frac{1}{4}$? In $1\frac{1}{2}$?
In $2\frac{3}{4}$? In $3\frac{3}{4}$? (*Show objectively by circles.*)
2. How many thirds in $1\frac{1}{3}$? In $2\frac{1}{3}$? In $7\frac{1}{3}$? In $10\frac{1}{3}$?
In $12\frac{1}{3}$? In $3\frac{2}{3}$? In $5\frac{2}{3}$?
3. How many fifths in $1\frac{1}{5}$? In $1\frac{2}{5}$? In $4\frac{3}{5}$? In $9\frac{4}{5}$?
4. How many sixths in $1\frac{1}{6}$? In $5\frac{2}{6}$? In $7\frac{5}{6}$? In $10\frac{5}{6}$?
5. How many sevenths in $3\frac{1}{7}$? In $4\frac{2}{7}$? In $12\frac{6}{7}$?
6. How many tenths in $5\frac{1}{10}$? In $1\frac{9}{10}$? In $10\frac{7}{10}$?
7. How many elevenths in $6\frac{1}{11}$? In $6\frac{8}{11}$? In $2\frac{10}{11}$?
In $9\frac{4}{11}$? In $10\frac{8}{11}$? In $11\frac{9}{11}$? In $12\frac{10}{11}$?
8. How many twelfths in $1\frac{5}{12}$? In $7\frac{11}{12}$? In $8\frac{11}{12}$?
In $6\frac{7}{12}$? In $4\frac{1}{12}$?
9. How are *mixed* numbers reduced to *improper* fractions?
10. How are *whole* numbers reduced to *improper* fractions?

XXVI.

Reduce to improper fractions:—

- | | | | |
|----------------------|-----------------------|----------------------|------------------------|
| 1. $8\frac{1}{4}$. | 4. $1\frac{6}{15}$. | 7. $9\frac{1}{11}$. | 10. $10\frac{1}{2}$. |
| 2. $11\frac{5}{7}$. | 5. $5\frac{7}{15}$. | 8. $11\frac{5}{9}$. | 11. $3\frac{7}{27}$. |
| 3. $9\frac{3}{8}$. | 6. $12\frac{1}{12}$. | 9. $5\frac{7}{17}$. | 12. $19\frac{9}{36}$. |

XXVII. (Oral.)

1. How many units are there in $\frac{5}{2}$? In $\frac{5}{3}$? In $\frac{7}{8}$?
In $\frac{10}{5}$? In $\frac{9}{4}$? In $\frac{12}{4}$? In $\frac{15}{5}$? In $\frac{13}{2}$? (*Show objectively by circles.*)
2. How many units in $\frac{15}{2}$? In $\frac{15}{3}$? In $\frac{15}{4}$? In $\frac{15}{5}$?
3. How many units in $8\frac{3}{4}$? In $8\frac{3}{5}$? In $4\frac{7}{8}$ miles?
In $\frac{100}{11}$ ounces? In $\frac{9}{11}$ bushels? In $\frac{110}{10}$ days?
4. How are *improper* fractions changed to *whole* numbers? To *mixed* numbers?

5. Express as whole or mixed numbers:—

A	B	C	D	E
$\frac{12}{3}$.	$\frac{15}{7}$.	$\frac{110}{11}$.	$\frac{12}{2}$.	$\$ \frac{88}{12}$.
$\frac{19}{3}$.	$\frac{18}{5}$.	$\frac{50}{9}$.	$\frac{51}{9}$.	$\frac{94}{11}$ lbs.
$\frac{20}{7}$.	$\frac{21}{7}$.	$\frac{83}{5}$.	$\frac{60}{12}$.	$\frac{109}{11}$ hours
$\frac{10}{6}$.	$\frac{75}{8}$.	$\frac{31}{7}$.	$\frac{75}{7}$.	$\frac{37}{9}$ days.

XXVIII.

Reduce to whole or mixed numbers:—

- | | | | |
|-----------------------|-----------------------|------------------------|------------------------|
| 1. $\frac{510}{11}$. | 4. $\frac{115}{10}$. | 7. $\frac{1103}{17}$. | 10. $\frac{520}{21}$. |
| 2. $\frac{173}{13}$. | 5. $\frac{2121}{7}$. | 8. $\frac{281}{13}$. | 11. $\frac{570}{70}$. |
| 3. $\frac{126}{8}$. | 6. $\frac{582}{13}$. | 9. $\frac{283}{14}$. | 12. $\frac{580}{37}$. |

XXIX. (Oral.)

- How many quarters in $\frac{1}{2}$?
How many eighths in $\frac{1}{4}$? In $\frac{3}{4}$?
How many twelfths in $\frac{1}{3}$? In $\frac{2}{3}$?
(Prove objectively.)
- How many sixths are there in $\frac{1}{2}$? $\frac{2}{3}$? $\frac{1}{3}$? $\frac{3}{4}$?
 $\frac{7}{8}$? 1 ? 7 ?
- How many twelfths are there in $\frac{1}{2}$? $\frac{1}{3}$? $\frac{1}{4}$? $\frac{2}{3}$?
 $\frac{3}{4}$? $\frac{1}{6}$? $\frac{5}{6}$? $\frac{11}{12}$? $\frac{12}{5}$? 1 ? 5 ?
- How many twenty-fourths are there in $\frac{1}{2}$? $\frac{1}{3}$?
 $\frac{1}{4}$? $\frac{1}{6}$? $\frac{1}{8}$? $\frac{12}{15}$? $\frac{7}{12}$? $\frac{5}{8}$? $\frac{11}{10}$? $\frac{7}{8}$? $\frac{11}{12}$?
- Change $\frac{1}{2}$, 2, 3, $\frac{2}{3}$, $\frac{7}{4}$, $\frac{5}{6}$, $\frac{11}{10}$, $\frac{5}{18}$ to thirty-sixths.
- Prove that $\frac{1}{2} = \frac{4}{8}$.
(a) By what number do you multiply the terms of the former fraction to get the latter?
(b) What general truth as to the value of fractions may be derived from the fact that $\frac{1}{2} = \frac{4}{8}$?
- $\frac{2}{3}$ and $\frac{4}{6}$ are called *equivalent* fractions. What is meant by that term?

8. Which would you rather have, $\$ \frac{3}{4}$ or $\$ \frac{2}{3}$?

A	B	C	D
9. $\frac{1}{8} = 10$	$\frac{2}{3} = 27$	$\frac{3}{8} = 48$	$\frac{5}{4} = 44$
$\frac{1}{2} = 12$	$\frac{3}{7} = 42$	$\frac{1}{11} = 132$	$\frac{5}{9} = 18$
$\frac{4}{5} = 15$	$\frac{7}{8} = 80$	$\frac{3}{8} = 24$	$\frac{1}{4} = 100$
$\frac{4}{5} = 45$	$\frac{7}{2} = 32$	$\frac{7}{16} = 160$	$\frac{7}{8} = 72$
$2 = 20$	$5 = 8$	$9 = 9$	$4 = 12$

XXX. (Oral.)

1. How many halves in $\frac{2}{4}$? $\frac{3}{8}$? $\frac{4}{8}$?
How many thirds in $\frac{2}{3}$? $\frac{4}{6}$? $\frac{8}{12}$?

(Prove objectively.)

2. How many fifths in $\frac{2}{10}$? $\frac{8}{40}$? $\frac{15}{75}$? $\frac{20}{100}$? $\frac{10}{50}$?
 $\frac{10}{50}$? $\frac{15}{75}$? $\frac{20}{100}$? $\frac{25}{125}$? $\frac{30}{150}$? 1 ? 5 ? 12 ?

3. How many tenths in 1 ? 2 ? $2\frac{1}{2}$? $3\frac{2}{10}$? $5\frac{4}{10}$?
 $6\frac{1}{5}$? $\frac{10}{100}$? $\frac{11}{110}$? $\frac{12}{120}$?

4. Change to ninths $\frac{1}{3}$, 1 , $\frac{2}{3}$, $2\frac{1}{3}$, $\frac{4}{9}$, $\frac{49}{9}$, $\frac{77}{9}$.

5. Reduce to *lower* terms $\frac{6}{12}$, $\frac{6}{18}$, $\frac{9}{36}$, $\frac{16}{32}$, $\frac{30}{60}$, $\frac{18}{36}$.

6. Reduce the fractions in the above example to *lowest* terms.

7. Reduce to *lowest* terms:—

A	B	C	D	E
$\frac{6}{8}$	$\frac{24}{32}$	$\frac{32}{36}$	$\frac{20}{30}$	$\frac{16}{20}$
$\frac{80}{100}$	$\frac{6}{9}$	$\frac{21}{28}$	$\frac{48}{60}$	$\frac{33}{44}$
$\frac{32}{48}$	$\frac{80}{96}$	$\frac{9}{15}$	$\frac{45}{60}$	$\frac{55}{66}$
$\frac{12}{18}$	$\frac{77}{84}$	$\frac{1200}{1200}$	$\frac{210}{210}$	$\frac{330}{330}$

8. When is a fraction in its *lowest* terms?

XXXI. (Oral.)

- A. Find the sum of:—

1. $\frac{3}{8}$, $\frac{1}{8}$. 4. $\frac{6}{13}$, $\frac{4}{13}$. 7. $\frac{3}{8}$, $\frac{5}{8}$. 10. $\frac{10}{50}$, $\frac{25}{50}$.
2. $\frac{4}{7}$, $\frac{3}{7}$. 5. $\frac{6}{17}$, $\frac{9}{17}$. 8. $\frac{21}{30}$, $\frac{9}{30}$. 11. $\frac{15}{42}$, $\frac{13}{42}$.
3. $\frac{5}{11}$, $\frac{6}{11}$. 6. $\frac{11}{13}$, $\frac{3}{13}$. 9. $\frac{8}{12}$, $\frac{2}{12}$. 12. $\frac{4}{25}$, $\frac{11}{25}$.

B. Find the difference between each pair of fractions in exercise A.

C. State which is the greater of each pair of fractions in exercise A.

XXXII.

A. Find the sum of:—

- | | | | |
|---------------------------------|---------------------------------|----------------------------------|-----------------------------------|
| 1. $\frac{1}{2}, \frac{1}{4}$. | 4. $\frac{1}{4}, \frac{1}{5}$. | 7. $\frac{1}{4}, \frac{3}{8}$. | 10. $\frac{2}{9}, \frac{3}{8}$. |
| 2. $\frac{1}{3}, \frac{1}{9}$. | 5. $\frac{1}{3}, \frac{2}{5}$. | 8. $\frac{2}{7}, \frac{1}{14}$. | 11. $\frac{5}{6}, \frac{1}{12}$. |
| 3. $\frac{1}{2}, \frac{1}{3}$. | 6. $\frac{2}{3}, \frac{1}{6}$. | 9. $\frac{4}{9}, \frac{5}{18}$. | 12. $\frac{2}{5}, \frac{3}{8}$. |

B. Find the difference between each pair of fractions in A.

C. Which is the greater of each pair of fractions in A?

XXXIII.

A. Find the sum of:—

- | | | |
|----------------------------------|-------------------------------------|--|
| 1. $\frac{7}{8}, \frac{5}{24}$. | 4. $\frac{29}{30}, \frac{5}{6}$. | 7. $\frac{3}{4}, \frac{7}{16}, \frac{3}{20}$. |
| 2. $\frac{2}{3}, \frac{3}{4}$. | 5. $\frac{11}{15}, \frac{17}{20}$. | 8. $\frac{9}{10}, \frac{37}{100}, \frac{1}{5}$. |
| 3. $\frac{2}{5}, \frac{4}{5}$. | 6. $\frac{7}{9}, \frac{5}{12}$. | 9. $\frac{7}{8}, \frac{5}{12}, \frac{31}{72}$. |

B. Find the sum of:—

- | | |
|--|---|
| 1. $2\frac{1}{2} + 3\frac{1}{4}$. | 7. $15\frac{8}{11} + 6\frac{23}{33}$. |
| 2. $5\frac{2}{7} + 6\frac{4}{21}$. | 8. $1\frac{3}{5} + 7\frac{8}{9} + 8\frac{4}{45}$. |
| 3. $9\frac{7}{10} + 6\frac{5}{20}$. | 9. $100\frac{1}{7} + 315\frac{1}{5}$. |
| 4. $3\frac{1}{2} + 10\frac{2}{3} + 7\frac{3}{4}$. | 10. $29\frac{17}{36} + 34\frac{11}{6}$. |
| 5. $4\frac{5}{8} + \frac{3}{13} + 7\frac{5}{12}$. | 11. $5\frac{7}{9} + 8\frac{11}{3} + 6\frac{5}{6}$. |
| 6. $6\frac{3}{4} + 3\frac{2}{3} + 6\frac{7}{8}$. | 12. $50\frac{1}{4} + 11 + 4\frac{5}{6}$. |

XXXIV.

A (Oral).

1. How much must be added to each of the following fractions to make the unit:—

- $\frac{1}{3}, \frac{5}{11}, \frac{12}{18}, \frac{9}{28}, \frac{10}{16}, \frac{20}{30}, \frac{1}{80}, \frac{99}{100}?$

2. How much does each of the following fractions lack of 1:—

$$\frac{1}{6}, \frac{4}{7}, \frac{9}{13}, \frac{11}{13}, \frac{40}{61}, \frac{17}{20}, \frac{2}{31}, \frac{17}{30}?$$

3. Take each of the following fractions from 1 and what is left:—

$$\frac{5}{8}, \frac{11}{16}, \frac{17}{18}, \frac{20}{23}, \frac{7}{30}, \frac{19}{30}?$$

B

- | | | |
|--------------------------|--------------------------|-----------------------------|
| 1. $1 - \frac{4}{5}$. | 5. $2 - \frac{8}{9}$. | 9. $7 - 6\frac{9}{10}$. |
| 2. $1 - \frac{7}{9}$. | 6. $20 - \frac{5}{13}$. | 10. $4 - 2\frac{3}{4}$. |
| 3. $5 - \frac{1}{2}$. | 7. $6\frac{3}{4} - 4$. | 11. $10 - 9\frac{1}{4}$. |
| 4. $11 - \frac{3}{11}$. | 8. $7\frac{9}{20} - 6$. | 12. $100 - 1\frac{1}{12}$. |

C

- | | | |
|-----------------------------------|---------------------------------------|--------------------------------------|
| 1. $\frac{5}{12} - \frac{1}{4}$. | 4. $9\frac{2}{7} - 6\frac{1}{2}$. | 7. $200\frac{1}{3} - \frac{1}{5}$. |
| 2. $\frac{3}{5} - \frac{1}{11}$. | 5. $15\frac{4}{9} - 10\frac{4}{10}$. | 8. $12\frac{4}{5} - 9\frac{3}{4}$. |
| 3. $\frac{8}{9} - \frac{5}{7}$. | 6. $11\frac{4}{8} - \frac{4}{11}$. | 9. $6\frac{5}{24} - 6\frac{3}{10}$. |

D

- | | | |
|-------------------------------------|--|---|
| 1. $1\frac{4}{5} - \frac{8}{9}$. | 6. $5\frac{1}{15} - 4\frac{11}{30}$. | 11. $1\frac{2}{21} - \frac{2}{14}$. |
| 2. $1\frac{7}{12} - 1\frac{1}{2}$. | 7. $2\frac{1}{11} - 1\frac{1}{2}$. | 12. $12\frac{3}{3} - 3\frac{25}{48}$. |
| 3. $3\frac{1}{4} - 2\frac{5}{8}$. | 8. $5\frac{2}{7} - 1\frac{8}{9}$. | 13. $4\frac{2}{9} - 3\frac{11}{18}$. |
| 4. $3\frac{1}{10} - 2\frac{1}{5}$. | 9. $16\frac{2}{3} - 3\frac{17}{30}$. | 14. $14\frac{1}{14} - 1\frac{11}{12}$. |
| 5. $7\frac{3}{8} - 5\frac{5}{11}$. | 10. $5\frac{3}{10} - 2\frac{13}{25}$. | 15. $3\frac{17}{30} - \frac{1}{12}$. |

XXXV. (Oral.)

1. A Reader costs $\$ \frac{1}{2}$ and a Geography $\$ \frac{3}{4}$. What will the two cost?

2. A dealer sold $\frac{5}{10}$ of a ton of coal to one person, $\frac{7}{10}$ to another, and $\frac{4}{10}$ to another. How much coal did he sell to all?

3. $\frac{3}{16} + \frac{7}{16} + \frac{6}{16} =$
 4. $\frac{7}{20} + \frac{11}{20} - \frac{3}{20} =$
 5. Subtract $\frac{1}{12}$ from $\frac{1}{4}$.

6. How many yards of ribbon in two pieces containing $4\frac{1}{2}$ yds. and $4\frac{1}{3}$ yds.?
7. From 1 take $\frac{2}{3}$.
8. A workman is paid $\$1\frac{7}{8}$ a day. What will he receive in two days?
9. One boy earns \$1 in 2 days, another \$1 in 3 days. How much a day does one boy earn more than another?
10. Spent $\frac{1}{2} + \frac{1}{3}$ of my money. What is left?
11. $\frac{3}{7} + \frac{1}{3} =$
12. $\frac{5}{9} - \frac{1}{2} =$
13. I pay $\$ \frac{3}{4}$ for sugar and $\$ \frac{1}{4}$ for rice. What have I left out of \$1?
14. I pay $\$ \frac{3}{4}$ for fish and $\$ \frac{1}{4}$ for meat. What have I left out of \$1?
15. From a stick 8 feet long $3\frac{3}{4}$ feet are broken. How many feet are left?
16. $10\frac{3}{4}$ yds. are sold from a piece of cloth measuring $18\frac{1}{2}$ yards. What is left?
17. Add $\frac{1}{2}$ and $\frac{1}{3}$ and take $\frac{1}{4}$ from the result.
18. $\frac{2}{3} + \frac{3}{10} - \frac{1}{2} =$
19. Which is the greater, $\frac{1}{4}$ or $\frac{1}{5}$?
20. Which is the greater, $\frac{2}{3}$ or $\frac{3}{4}$?
21. Which is the greater, $\frac{2}{3}$ or $\frac{6}{15}$?
22. I cut a melon into halves and again divide each half into 3 equal parts. I give Harry 3 of the pieces and Charlotte 2, and keep the rest myself. What part of the melon has Harry? What part has Charlotte? What part have I?
23. How would you find $\frac{3}{4}$ of an orange?
24. How many 6ths, 9ths, 10ths are there in 3?
25. Change to 16ths, $\frac{1}{2}$, $\frac{5}{8}$, 1, $1\frac{1}{2}$, $3\frac{1}{4}$.
26. Express 3, 8, $\frac{5}{6}$, $\frac{2}{3}$ with denominator 30.

27. $\$ \frac{5}{10} = \$ \frac{1}{2}$.

(a) What kind of fractions are these called?

(b) What has been done to the first fraction to get the second?

(c) What general truth as to the value of fractions may be derived from this?

28. When are fractions *similar*?

29. Previous to what three operations must *unlike* fractions be changed to *similar* fractions?

30. Change $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{12}$, $\frac{11}{20}$, $\frac{8}{15}$, $\frac{7}{36}$ to similar fractions.

XXXVI.

1. A farmer has three ploughed fields, the first containing $16\frac{5}{8}$ acres, the second $9\frac{9}{16}$ acres and the third $7\frac{3}{4}$ acres. How many acres are ploughed?

2. You desire to put barbed wire round a field whose four sides measure $160\frac{1}{2}$ yds., $121\frac{2}{3}$ yds., $178\frac{5}{9}$ yds. and $125\frac{7}{12}$ yds. respectively. How many yards of wire do you need?

3. If you have 600 yards of wire for the above field, how many yards will be left?

4. How much must be added to $15\frac{9}{11}$ lbs. to make $16\frac{1}{4}$ lbs.?

5. I spend $\$ \frac{5}{6}$ and $\$ \frac{1}{12}$ and give away $\$ \frac{1}{4}$. What part of my dollar have I left?

6. How much must be added to the sum of $\frac{3}{4}$, $\frac{2}{5}$, $\frac{11}{15}$ to make 3?

7. A man bought three pieces of cloth, one of which contained $45\frac{3}{4}$ yards, another $63\frac{5}{8}$ yards, and the other $56\frac{1}{2}$ yards. How many yards did he buy?

8. $22\frac{11}{12}$ cords of wood are put into the school for fuel during the winter; $4\frac{7}{10}$ cords are left in spring. How many cords have been used?

9. Bought a horse for $\$97\frac{5}{8}$ and a sleigh for $\$54\frac{1}{2}$.
 (a) How much more did one cost than the other? (b) How much did both cost?

10. $\frac{2}{5}$ of a field is set apart for wheat, and $\frac{3}{10}$ for clover; the remainder is for potatoes. What part of the field is for potatoes?

11. Subtract $\frac{1}{2} + \frac{2}{15}$ from $\frac{4}{3} + \frac{1}{6} - \frac{1}{5}$.

12. From 1 take $\frac{1}{4}$ and from the result take $\frac{1}{10}$.

13. $2 - 1\frac{1}{2} - \frac{1}{8} - \frac{2}{8}$

14. $2 + 4\frac{1}{3} - 6\frac{1}{12} - \frac{5}{4}$

15. Add $\frac{2}{3}$, $\frac{1}{2}$, $\frac{5}{6}$, and take $\frac{1}{10}$ from the sum.

16. $\frac{3}{4}$, $\frac{4}{5}$, $1\frac{3}{4}$. (a) Add. (b) Which is the greatest and which the least? (c) From the greatest take the least.

17. A tradesman receives on Monday $\$19\frac{1}{2}$, on Tuesday $\$16\frac{2}{3}$, on Wednesday $\$23\frac{2}{5}$, on Thursday $\$15\frac{5}{6}$, on Friday $\$17\frac{3}{4}$ and on Saturday $\$35$. Find

(a) How much he received during the week.

(b) The difference between the sum of his receipts on Monday and Wednesday and on Friday and Saturday.

(c) The difference between the sum of his receipts on the first 3 days and the last 3 days of the week.

18. I cut from an apple a half, a third and a seventh. What part remains?

19. If a pupil is absent $1\frac{1}{2}$ days the first week, $\frac{2}{3}$ of a day the second, $2\frac{5}{8}$ days the third and $\frac{1}{4}$ of a day the fourth week, how much time has he lost in the month? If the month has 21 school days, how many days has he been present?

20. A lady paid $\$1\frac{7}{8}$ for gloves, $\$7\frac{1}{8}$ for a dress and $\$17\frac{3}{10}$ for a cloak. What change should she get from three ten-dollar bills?

21. A barrel of apples weighed $175\frac{1}{2}$ lbs. The weight of the barrel alone was $17\frac{1}{10}$ lbs. What was the weight of the apples?

22. The sum of two numbers is $100\frac{4}{5}$, the less is $29\frac{37}{100}$. What is the greater?

23. I have $\frac{3}{5}$ of one apple and $\frac{1}{2}$ of another. I put them together and divide them equally between Tom and Clara. What part of an apple does each get?

24. $98\frac{1}{10} - 97\frac{3}{4} + \frac{3}{12}$.

25. $217 - \frac{1}{2} - 190\frac{5}{7}$.

XXXVII. (Oral.)

Find the cost of:—

- | | | | | | |
|-----|----|----------|----|-------------------|-------|
| 1. | 3 | articles | at | $\$ \frac{1}{2}$ | each. |
| 2. | 5 | " | " | $\$ \frac{1}{3}$ | " |
| 3. | 5 | " | " | $\$ \frac{2}{3}$ | " |
| 4. | 7 | " | " | $\$ \frac{3}{10}$ | " |
| 5. | 9 | " | " | $\$ \frac{5}{8}$ | " |
| 6. | 8 | " | " | $\$ \frac{6}{7}$ | " |
| 7. | 11 | " | " | $\$ \frac{7}{9}$ | " |
| 8. | 4 | " | " | $\$ \frac{1}{2}$ | " |
| 9. | 8 | " | " | $\$ \frac{3}{10}$ | " |
| 10. | 5 | " | " | $\$ \frac{3}{10}$ | " |
| 11. | 7 | " | " | $\$ \frac{2}{1}$ | " |
| 12. | 9 | " | " | $\$ \frac{5}{7}$ | " |
| 13. | 4 | " | " | $\$ \frac{3}{8}$ | " |

There are two ways of multiplying $\frac{3}{4}$ by 4. What are they? Which of the two is the shorter?

XXXVIII.

A

- | | | |
|------------------------------|-------------------------------|--------------------------------|
| 1. $\frac{9}{25} \times 5$. | 4. $\frac{8}{35} \times 11$. | 7. $\frac{28}{24} \times 12$. |
| 2. $\frac{3}{12} \times 6$. | 5. $\frac{23}{40} \times 5$. | 8. $\frac{47}{8} \times 24$. |
| 3. $\frac{1}{18} \times 9$. | 6. $\frac{15}{33} \times 9$. | 9. $\frac{17}{28} \times 7$. |

FRACTIONS.

B

- | | | | | | |
|--------------------------|----|---------------------------|----|------------------------|-----|
| 1. $\frac{3}{8} \times$ | 2. | 4. $\frac{11}{13} \times$ | 7. | $\frac{19}{11} \times$ | 8 |
| 2. $\frac{4}{7} \times$ | 3. | 5. $\frac{14}{17} \times$ | 8. | $\frac{8}{9} \times$ | 17. |
| 3. $\frac{7}{11} \times$ | 6. | 6. $\frac{11}{14} \times$ | 9. | $\frac{13}{30} \times$ | 13. |

C

- | | | | | | |
|---------------------------|-----|-----------------------------|-----|------------------------------|-----|
| 1. $7\frac{1}{2} \times$ | 2. | 8. $4\frac{2}{3} \times$ | 5. | 15. $100\frac{1}{3} \times$ | 10. |
| 2. $6\frac{2}{3} \times$ | 3. | 9. $3\frac{1}{2} \times$ | 7. | 16. $15\frac{2}{9} \times$ | 6. |
| 3. $9\frac{2}{5} \times$ | 5. | 10. $6\frac{3}{7} \times$ | 5. | 17. $12\frac{5}{8} \times$ | 6 |
| 4. $18\frac{2}{3} \times$ | 10. | 11. $5\frac{3}{11} \times$ | 11. | 18. $23\frac{11}{12} \times$ | 30. |
| 5. $11\frac{3}{4} \times$ | 8. | 12. $50\frac{7}{8} \times$ | 7. | 19. $41\frac{2}{30} \times$ | 8. |
| 6. $3\frac{1}{4} \times$ | 14. | 13. $84\frac{9}{7} \times$ | 12. | 20. $100\frac{1}{14} \times$ | 9. |
| 7. $8\frac{2}{3} \times$ | 12. | 14. $105\frac{3}{4} \times$ | 9. | 21. $60\frac{7}{10} \times$ | 15. |

D

- | | | |
|-------------------------------|-------------------------------|---------------------------------|
| 1. $15 \times 2\frac{3}{4}$ | 5. $642 \times 3\frac{1}{2}$ | 9. $54 \times 5\frac{8}{9}$ |
| 2. $10 \times 6\frac{5}{7}$ | 6. $116 \times 4\frac{3}{4}$ | 10. $703 \times 6\frac{7}{12}$ |
| 3. $22 \times 9\frac{7}{10}$ | 7. $231 \times 8\frac{1}{3}$ | 11. $902 \times 4\frac{2}{3}$ |
| 4. $1005 \times 7\frac{1}{5}$ | 8. $500 \times 11\frac{5}{6}$ | 12. $231 \times 10\frac{6}{11}$ |

XXIX.

A (Oral).

- What is $\frac{1}{2}$ of 6? Of 7? Of 12? Of 17?
- What is $\frac{1}{3}$ of 15, 16, 17, 18, 19?
- What is $\frac{2}{3}$ of 15, 16, 17, 18, 19?
- $\frac{2}{3} \times 6$; $\frac{2}{3}$ of 6.
- $\frac{2}{3} \times 10$; $\frac{2}{3}$ of 10.
- $\frac{5}{7}$ of 63; $63 \times \frac{5}{7}$; $\frac{5}{7} \times 63$.
- $\frac{8}{9}$ of 50; $\frac{11}{17}$ of 100; $\frac{11}{16}$ of 100.
- Having 20 quarts of berries, I sold $\frac{3}{4}$ of them. How many quarts did I sell?
- In a school of 80 pupils $\frac{3}{8}$ are under 8 years old, $\frac{2}{5}$ are between 8 and 12 years, $\frac{1}{10}$ are 13 years and the rest are older. Find the number at each age.
- What is the force of the word *of* between fractions?

B

1. $\frac{3}{4}$ of $\frac{7}{8}$.
2. $\frac{4}{5} \times \frac{3}{5}$.
3. $\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4}$.
4. $\frac{7}{8} \times \frac{3}{5} \times \frac{9}{10}$.
5. $\frac{11}{12} \times \frac{1}{11}$.
6. $3 \times 3\frac{1}{4} \times \frac{1}{13}$.
7. $8\frac{3}{4} \times 7\frac{3}{8}$.
8. $2\frac{1}{4} \times \frac{1}{3}$.
9. $\frac{1}{7}$ of $3\frac{1}{2}$.
10. $\frac{1}{11}$ of $2\frac{1}{2}$.
11. $\frac{5}{9}$ of $2\frac{1}{10}$.
12. $7\frac{1}{3}$ of $2\frac{1}{12}$.
13. $7\frac{1}{7}$ of $2\frac{1}{10}$.
14. $5\frac{1}{3}$ of 16.
15. $\frac{1}{10}$ of $3\frac{1}{2}$.
16. $7\frac{1}{7} \times 21$.
17. $12\frac{1}{2} \times 10$.
18. $100\frac{1}{5} \times 10$.
19. $\frac{3}{7}$ of $25 \times \frac{2}{3}$.
20. $\frac{5}{8}$ of $30 \times \frac{9}{12}$ of $\frac{3}{4}$.

(Prove the first 3 examples objectively.)

XL.

Express as dollars and cents:—

1. $\$ \frac{3}{4}$, $\$ \frac{7}{10}$, $\$ \frac{1}{2}$, $\$ \frac{3}{4}$, $\$ \frac{2}{3}$, $\$ \frac{1}{5}$.
2. $\$ \frac{5}{7}$, $\$ \frac{7}{11}$, $\$ \frac{2}{3}$, $\$ \frac{1}{12}$, $\$ \frac{2}{3}$, $\$ \frac{3}{5}$.
3. $\$ 5\frac{1}{4}$, $\$ 16\frac{1}{5}$, $\$ 20\frac{1}{3}$, $\$ 100\frac{5}{8}$.
4. $\frac{4}{5}$ of $\$ 6\frac{1}{4}$; $\frac{3}{11}$ of $\$ 8\frac{1}{4}$.
5. $2\frac{1}{4}$ of $\$ 2\frac{3}{4}$; $3\frac{1}{2}$ of $\$ 2\frac{1}{4}$.
6. $\frac{1}{10}$ of $\$ 5\frac{1}{2}$; $\frac{7}{8}$ of $\$ 6\frac{3}{5}$.

XLI.

A (Oral).

1. 5 dozen eggs at $12\frac{1}{2}$ cents a dozen.
2. 8 yards at $\$ \frac{3}{8}$ a yard.
3. 4 tons coal at $\$ 6\frac{3}{4}$ a ton.
4. 6 lbs. butter at $33\frac{1}{3}$ cents a lb.
5. 5 lbs. tea at $\$ \frac{3}{8}$ a lb.
6. A man earns $\$ \frac{2}{7}$ a day. How much in a week?
7. At $3\frac{1}{3}$ miles an hour, how far can I walk in 6 hours? In 10 hours?
8. How many pints of strawberries are picked by 5 boys, if each picks $3\frac{3}{4}$ pints?
9. $\frac{2}{3}$ of 20.

10. $\frac{3}{4}$ of the number of days in September.
11. $\frac{3}{4}$ of $\frac{1}{2}$.
12. I own $\frac{2}{3}$ of a farm and sell $\frac{1}{2}$ of my share. What part of the farm do I sell?
13. What part of the farm do I still own?
14. $3\frac{1}{2}$ is $\frac{1}{2}$ of what number?
15. $4\frac{2}{3}$ is $\frac{1}{3}$ of what number?
16. If $\frac{2}{5}$ of a sum of money is lost, what part remains?
17. If $\frac{1}{3}$ of a sum of money is \$10, what is the sum?
18. It takes me $\frac{5}{12}$ of an hour to walk to school. How many minutes?
19. A class consists of 50 scholars; $\frac{2}{5}$ are girls and the rest boys. How many of each sex?
20. A pole 18 feet long is painted red, white and blue; $\frac{1}{3}$ is red, $\frac{1}{3}$ of the remainder is blue, and the rest white. How many feet of each colour?
21. $\frac{2}{7}$ of a field containing 14 acres is sown in potatoes and the rest in wheat. How many acres are sown in wheat?

B

1. How many miles are travelled in $7\frac{1}{8}$ hours at the rate of $3\frac{1}{2}$ miles an hour?
2. If a yd. of silk cost $\$1\frac{1}{3}\frac{1}{2}$, what will $7\frac{1}{10}$ yds. cost?
3. If each of 28 boys receive $\frac{2}{7}$ of a pie, how many pies are used?
4. If a farm cost \$2150, what is $\frac{2}{5}$ of it worth?
5. The divisor is $7\frac{3}{11}$, the quotient $4\frac{2}{3}$. What is the dividend?
6. $\frac{3}{4} \times \frac{7}{8} \times \frac{9}{15} \times \frac{5}{7} \times 1\frac{1}{2}$.
7. What is the product of $3\frac{3}{4}$ and $5\frac{1}{3}$? What is their sum? From the product take the sum.
8. How many pieces $\frac{1}{6}$ of a foot long can be cut from 5 feet of ribbon?

9. If a field cost \$26, what will $\frac{3}{4}$ of it cost?
10. If a herd of cattle number 112, how many cattle are in $\frac{1}{4}$ of the herd?
11. Two girls pick berries: one picks $9\frac{3}{4}$ quarts, the other $7\frac{3}{4}$ quarts. How much will they get together for them at $2\frac{3}{4}$ cents a quart?
12. At \$3 $\frac{1}{4}$ a day, how much will a man earn in 100 days?

XLII.

A (Oral).

1. Divide 4 dollars by 2; 4 sevenths by 2; $\frac{4}{5}$ by 2.
2. Divide $\frac{3}{4}$ by 2; $\frac{3}{5}$ by 3; $\frac{4}{5}$ by 3; $\frac{4}{7}$ by 4; $\frac{4}{11}$ by 4.
3. If you divide $\frac{1}{2}$ of a dollar among 3 boys, what part of a dollar will each get?
4. Show objectively that $\frac{1}{3}$ of a circle $\div 2 = \frac{1}{6}$ of a circle.
5. Show objectively that $\frac{2}{3} \div 2 = \frac{1}{3}$.
6. There are two ways of dividing $\frac{2}{3}$ by 2. What are they? Which is the shorter?

B

Divide:—

- | | | |
|---------------------------|---------------------------|----------------------------|
| 1. 20 by 7. | 8. $\frac{3}{8}$ by 12. | 15. $4\frac{1}{8}$ by 8. |
| 2. 30 by 4. | 9. $\frac{1}{10}$ by 5. | 16. $6\frac{5}{12}$ by 12. |
| 3. 33 by 6. | 10. $\frac{9}{11}$ by 4. | 17. $10\frac{2}{3}$ by 8. |
| 4. 3 by 4. | 11. $\frac{6}{13}$ by 6. | 18. $12\frac{1}{4}$ by 14. |
| 5. 15 by 25. | 12. $\frac{4}{5}$ by 5. | 19. $10\frac{2}{3}$ by 24. |
| 6. $\frac{7}{8}$ by 7. | 13. $8\frac{1}{4}$ by 11. | 20. $10\frac{1}{2}$ by 9. |
| 7. $\frac{11}{14}$ by 11. | 14. $9\frac{3}{8}$ by 7. | 21. $2\frac{2}{3}$ by 7. |

C (Oral).

1. In 4 how many thirds are there?
2. How many times is a third contained in 4?
3. How many times are 2 thirds contained in 4?

4. How many times is $\frac{1}{2}$ contained in $3\frac{1}{2}$? In $4\frac{1}{2}$? In $4\frac{3}{4}$? In $4\frac{1}{4}$?

5. Divide 4 by $\frac{2}{3}$.

6. How often is $\frac{1}{4}$ lb. contained in 8 lbs. $\frac{1}{10}$ yard in 6 yards? $\frac{1}{100}$ in 810?

7. Divide 6 by $\frac{1}{2}$ by $\frac{3}{4}$.

8. From the result $6 \div \frac{1}{2} = 10$, find the rule for dividing by a fraction.

D

- | | | |
|---|---|--------------------------------------|
| 1. $6 \div \frac{2}{3} = 6 \cdot \frac{3}{2}$ | 7. $\frac{3}{4} \div \frac{1}{2} = \frac{3}{4} \cdot \frac{2}{1}$ | 13. $\frac{1}{2} \div 5\frac{1}{2}$ |
| 2. $7 \div \frac{5}{8} = 7 \cdot \frac{8}{5}$ | 8. $\frac{1}{2} \div 1\frac{1}{2} = \frac{1}{2} \cdot \frac{2}{3}$ | 14. $4\frac{1}{2} \div 3\frac{1}{2}$ |
| 3. $9 \div \frac{1}{4} = 9 \cdot 4$ | 9. $3\frac{1}{2} \div \frac{1}{2} = 3\frac{1}{2} \cdot 2$ | 15. $1\frac{1}{2} \div \frac{1}{3}$ |
| 4. $10 \div \frac{3}{4} = 10 \cdot \frac{4}{3}$ | 10. $8\frac{1}{2} \div \frac{3}{4} = 8\frac{1}{2} \cdot \frac{4}{3}$ | 16. $7\frac{1}{2} \div 2\frac{1}{2}$ |
| 5. $\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \cdot 4$ | 11. $5\frac{1}{2} \div 3\frac{1}{2} = 5\frac{1}{2} \cdot \frac{2}{3}$ | 17. $1 \div 9\frac{1}{2}$ |
| 6. $\frac{1}{3} \div \frac{1}{2} = \frac{1}{3} \cdot 2$ | 12. $3\frac{1}{2} \div 1\frac{1}{2} = 3\frac{1}{2} \cdot \frac{2}{3}$ | 18. $2\frac{3}{4} \div 3\frac{3}{4}$ |

E

Work by dividing the numerator:—

- | | |
|-----------------------------------|------------------------------------|
| 1. $\frac{3}{4} \div 3, 4, 6, 9.$ | 4. $\frac{1}{2} \div 3, 4, 6, 12.$ |
| 2. $1\frac{1}{2} \div 3, 6, 7.$ | 5. $\frac{3}{8} \div 5, 7, 35.$ |
| 3. $\frac{1}{2} \div 6, 7, 21.$ | 6. $\frac{1}{3} \div 3, 5, 9, 15.$ |

Work by multiplying the denominator:—

- | | |
|------------------------------------|-------------------------------------|
| 7. $\frac{2}{3} \div 3, 5, 7, 9.$ | 10. $\frac{1}{7} \div 7, 9, 11.$ |
| 8. $\frac{2}{7} \div 2, 4, 5, 8.$ | 11. $\frac{1}{2} \div 2, 4, 6, 10.$ |
| 9. $\frac{1}{10} \div 4, 7, 8, 5.$ | 12. $\frac{4}{5} \div 2, 3, 4, 5.$ |

Work by either method or both:—

- | | |
|---------------------------------------|--------------------------------------|
| 13. $\frac{5}{8} \div 5, 10, 15, 30.$ | 16. $\frac{1}{3} \div 6, 8, 10.$ |
| 14. $\frac{2}{7} \div 6, 18, 36, 60.$ | 17. $\frac{1}{8} \div 3, 5, 30, 45.$ |
| 15. $\frac{1}{10} \div 2, 4, 6, 8.$ | 18. $\frac{1}{6} \div 4, 5, 7, 10.$ |

Work by reducing the dividend to an improper fraction:—

- | | |
|------------------------------------|--------------------------------------|
| 19. $1\frac{1}{2} \div 7, 21, 28.$ | 22. $2\frac{1}{2} \div 2, 3, 5, 6.$ |
| 20. $3\frac{3}{4} \div 4, 9, 11.$ | 23. $7\frac{1}{3} \div 2, 3, 5, 11.$ |
| 21. $2\frac{1}{4} \div 2, 13, 26.$ | 24. $4\frac{3}{8} \div 2, 7, 9, 11.$ |

Work without reducing the dividend to an improper fraction:—

25. $19\frac{1}{2} \div 2, 3, 4, 5.$

28. $315\frac{1}{2} \div 2, 3, 4, 5.$

26. $24\frac{3}{8} \div 5, 6, 7, 8.$

29. $213\frac{1}{4} \div 3, 5, 7, 8.$

27. $34\frac{3}{8} \div 2, 5, 6, 17.$

30. $101\frac{3}{8} \div 2, 4, 5, 7.$

Work by inverting the divisor:—

31. $\frac{3}{4} \div \frac{3}{8}.$

38. $2\frac{1}{2} \div \frac{3}{4}.$

45. $6\frac{1}{2} \div 4\frac{1}{8}.$

32. $\frac{7}{8} \div \frac{5}{11}.$

39. $\frac{7}{8} \div 2\frac{1}{4}.$

46. $3\frac{1}{8} \div 9\frac{1}{2}.$

33. $\frac{5}{8} \div \frac{1}{11}.$

40. $\frac{4}{8} \div 7\frac{3}{10}.$

47. $9\frac{1}{8} \div 3\frac{1}{2}.$

34. $\frac{3}{8} \div \frac{1}{11}.$

41. $3\frac{3}{8} \div \frac{3}{14}.$

48. $2\frac{8}{11} \div 2\frac{1}{7}.$

35. $\frac{5}{10} \div \frac{1}{100}.$

42. $\frac{2}{11} \div 1\frac{5}{7}.$

49. $13\frac{1}{4} \div 7\frac{7}{8}.$

36. $\frac{1}{5} \div \frac{9}{10}.$

43. $9\frac{5}{8} \div \frac{1}{16}.$

50. $1\frac{1}{10} \div 3\frac{1}{2}.$

37. $\frac{7}{8} \div \frac{1}{11}.$

44. $1\frac{1}{2} \div 5\frac{1}{2}.$

51. $9\frac{1}{8} \div 4\frac{1}{2}.$

52. $2\frac{1}{4}$ of $1\frac{1}{2} \div 1\frac{1}{4}$ of $2\frac{3}{4}.$

53. $3\frac{3}{8}$ of $5\frac{1}{4}$ of $7\frac{1}{2} \div 63$

54. $7\frac{1}{2}$ of $3\frac{1}{2} \div 1\frac{1}{10}$ of $1\frac{1}{2}.$

F

1. In how many hours do I walk $12\frac{3}{4}$ miles if I walk $4\frac{1}{2}$ miles an hour?

2. Divide $\$18\frac{1}{2}$ among 22 persons.

3. If I spend $\$18\frac{3}{8}$ in $3\frac{1}{6}$ weeks, what do I spend a week?

4. By what must $13\frac{3}{4}$ be divided to reduce it to $3\frac{3}{8}$?

5. At $1\frac{1}{2}$ cents each, how many pencils can be bought for $\$5$?

6. At $16\frac{1}{2}$ cents a lb., how many lbs. of butter can be bought for $87\frac{1}{2}$ cents?

XLIII.

A

1. Find the cost of one if

4 cost 80 cents.

$\frac{4}{7}$ " 80 "

$\frac{3}{8}$ " 15 "

$\frac{5}{8}$ " 20 "

$\frac{2}{3}$ cost $\$1.00.$

$\frac{3}{4}$ " $\$6.00.$

$\frac{4}{11}$ " $\$8.00.$

$\frac{3}{7}$ " $\$21.00.$

2. Find the number of which

4 is $\frac{1}{4}$. 15 is $\frac{3}{5}$.
 16 is $\frac{4}{5}$. 45 is $\frac{5}{7}$.
 21 is $\frac{7}{8}$. 48 is $\frac{4}{15}$.

3. How much can you buy for one dollar, if

$\$ \frac{1}{3}$ will buy 4 yds. $\$ \frac{7}{12}$ will buy 14 oz.
 $\$ \frac{4}{9}$ " " 8 lbs. $\$ \frac{1}{3}$ " " 20 gal.
 $\$ \frac{2}{7}$ " " 18 qts. $\$ \frac{11}{12}$ " " 33 pts.

4. A boy loses 15 cents, which is $\frac{3}{10}$ of his money. How much had he?

5. $\frac{1}{3}$ of a farm contains 100 acres. How many acres in the farm?

6. $\frac{1}{15}$ of a flock of sheep are 147. How many sheep in the flock?

7. 40 days are $\frac{2}{5}$ of the holidays. How long are the holidays?

8. $\frac{2}{7}$ of a pole is above water and the rest, which measures 10 feet, is below. How long is the pole?

B (Oral).

1. $\frac{2}{9}$ of my age is 6 years. What is $\frac{1}{9}$ of my age? How old am I?

2. $\frac{3}{8}$ of my age is 12 years. What is $\frac{1}{8}$ of my age? How old am I? George's age is $\frac{3}{4}$ of mine. How old is George?

3. $\frac{3}{10}$ of a yard costs 12 cents. What will $\frac{1}{10}$ cost? What will one yard cost? What will $\frac{1}{4}$ yard cost? What will $\frac{3}{4}$ yard cost?

4. $\frac{2}{5}$ of an acre costs \$12. What will $\frac{1}{5}$ of an acre cost? What will 1 acre cost? 10 acres? $\frac{1}{8}$ acre? $\frac{5}{8}$ acre? $\frac{1}{4}$ acre? $\frac{3}{4}$ acre?

5. 40 oranges can be bought for $\$ \frac{3}{4}$. How many for $\$ \frac{1}{4}$? For \$1? For $\$ \frac{1}{10}$? For $\$ \frac{7}{10}$?

6. $\frac{5}{6}$ of a number is 30. What is the number? What is $\frac{2}{3}$ of the number?

7. $\frac{3}{4}$ of a number is 6. Find $\frac{1}{2}$ of the number.

8. $\frac{1}{6}$ of a number is 2. Find $\frac{1}{4}$ of the number.

9. $\frac{1}{5}$ of a number is 6. Find $\frac{2}{3}$ of the number.

10. 14 is $\frac{7}{8}$ of a number. Find $\frac{3}{4}$ of the number.

C

1. If $\frac{3}{4}$ yard silk cost 90 cents, what is $\frac{1}{2}$ yard worth?

2. If $\frac{3}{4}$ yard cost 90 cents, what will $\frac{5}{6}$ yard cost?

3. $\frac{2}{3}$ of a load of hay weighs 1500 lbs. What will $\frac{9}{10}$ weigh?

4. $\frac{2}{3}$ of a field produces 90 bags of potatoes. How many bags will $\frac{5}{6}$ produce?

5. If $\frac{1}{11}$ of a number is 8, what is half the number?

6. If \$1 buys 18 balls, how many can be bought for \$ $\frac{2}{3}$?

7. $\frac{2}{3}$ of my farm is worth \$2400. What is $\frac{1}{2}$ of it worth?

8. If a man cuts 10 cords of wood in $\frac{5}{6}$ of a week, how much will he cut in $1\frac{1}{2}$ weeks?

9. If $3\frac{1}{2}$ barrels of apples cost \$5.20, what will $\frac{2}{3}$ of a barrel cost?

10. If 7 yards ribbon can be bought for \$1 $\frac{5}{6}$, what will 20 yards cost?

REVIEW EXERCISES.

A (Oral).

1. Which is more, $\frac{1}{2}$ or $\frac{1}{3}$?

2. Take $\frac{1}{2}$ from $\frac{2}{3}$?

3. $\frac{2}{3}$ of a cake divided among 3 girls. How much for each?

4. $4\frac{1}{2}$ lbs. at 10 cents per $\frac{1}{2}$ lb.?

5. Which is greater, $\frac{2}{3}$ of 18 or $\frac{3}{4}$ of 25?

6. $\frac{1}{2} + \frac{1}{3} = \frac{1}{?}$

7. $\frac{7}{8}$ of a waggon is worth \$56. Find the full value.
8. $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
9. In \$2 how many half cents? 40
10. In $5\frac{2}{3}$ how many sixths?
11. $3 - 1\frac{1}{2} = 1\frac{1}{2}$
12. $\frac{7}{12}$ of an apple eaten. How much left? $\frac{5}{12}$
13. Add $\frac{1}{2}$ and $\frac{1}{3}$. Which is greater? and by how much? $\frac{5}{6}$
14. 28 sevenths - 20 fifths? 0
15. Add $\frac{1}{4}$ of 16, $\frac{1}{5}$ of 27 and $\frac{2}{3}$ of 9.
16. $5 - \frac{1}{2} + \frac{3}{4}$?
17. What is a quarter of $\frac{1}{4}$?
18. $\frac{1}{4}$ of \$2?
19. What part of an hour is 10 minutes?
20. $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{4}$?
21. Cost of 9 lbs., if 7 cost \$0.42?
22. $\frac{5}{8}$ of a horse cost \$20. Full cost?
23. I work 5 sums in 15 minutes. How many in 20 minutes?
24. Frank ate $\frac{1}{2}$ and $\frac{1}{3}$ of a melon. What is left?
25. $10\frac{1}{2}$ apples at $1\frac{1}{2}$ cents each?
26. By what is $\frac{2}{3} - \frac{1}{4}$ less than 5?
27. $\frac{4}{7}$ of 350?
28. 4 cost \$2. How many for \$10?
29. 100 nuts at 10 for 3 cents?
30. How many ninths in 11?
31. $\frac{5}{8}$ of a dollar?
32. If 15 cost \$5, how much for one?
33. L.C.M. of 15, 45, 3?
34. 3 dozen at 3 for a cent?
35. 50 marbles at $\frac{1}{4}$ of a cent each?
36. Which is greater, $\frac{1}{3}$ or $\frac{2}{13}$?
37. $\frac{3}{10}$ of an article is worth \$60. What is the whole worth?

38. 30 five-dollar bills + 30 two-dollar bills?
39. $\frac{1}{20}$ of 200?
40. $\frac{2}{3}$ of 16?
41. $\frac{1}{2}$ of $8\frac{1}{2}$?
42. Buns at $\frac{1}{2}$ cent each; how many for 75 cents?
43. What fraction of 77 is 7?
44. $\frac{11}{12}$ of 144?
45. Multiply $\frac{1}{4}$ of 32 by $9\frac{1}{2}$.
46. $\frac{4}{10}$ of \$21?
47. 57×100 ?
48. $3\frac{3}{4}$ yards of silk at \$4 a yard?
49. Paid \$20 for cloth at $\frac{2}{3}$ a yard. How many yards?
50. How often is $\frac{3}{4}$ of a gallon contained in 9 gallons?
51. What part of 100 must you take to leave 50?
52. From two trees 100 barrels of apples were gathered; $\frac{1}{4}$ of them were sold. How many were sold?
53. $\frac{1}{3}$ of the remainder were rotten. How many were rotten?
54. In a certain school are 180 pupils; $\frac{2}{3}$ are girls. How many girls? How many boys?
55. Divide $2\frac{2}{11}$ by 8.
56. How many times is $\$ \frac{2}{3}$ contained in $\$4\frac{2}{3}$?
57. A does a piece of work in 2 days. What part will he do in one day?
58. B does the same work in 3 days. What part will he do in one day?
59. What part will A and B do together in one day?
60. If A and B together can do $\frac{2}{3}$ of a piece of work in one day, how long will it take them to do the whole?

B

1. Bought $7\frac{1}{2}$ lbs. butter at 20 cents, and $5\frac{3}{4}$ dozen eggs at 40 cents. What change from \$5?

2. A farmer gave $\$3\frac{1}{3}$ apiece for sheep. How many did he buy for $\$150$?
3. At $\$12\frac{1}{2}$ an acre, how many acres can be bought for $\$500$?
4. When wood is $\$8\frac{3}{4}$ a cord, what must I pay for $\frac{1}{5}$ of a cord?
5. If I pay $\$4\frac{1}{2}$ for 6 lbs., what do I pay for 15 lbs.?
6. What will 4 men earn in $3\frac{1}{2}$ days at $\$1\frac{1}{2}$ each a day?
7. A man leaves $\$20,000$: $\frac{1}{4}$ to each of his 3 children and the rest to his widow. What does each get?
8. $8\frac{1}{4}$ lbs. beef at 15 cents; $16\frac{1}{2}$ lbs. lard at 9 cents. Gave $\$4$. What is my change?
9. 75 is $\frac{3}{4}$ of what number?
10. How many hours will it take to walk 30 miles at the rate of $2\frac{1}{2}$ miles an hour?
11. How far will you walk in 3 days, walking $5\frac{1}{2}$ hours a day, at the rate of $2\frac{3}{4}$ miles an hour?
12. From 10 lbs. of coffee $6\frac{1}{4}$ lbs. were sold. What is the remainder worth at $\$2\frac{2}{3}$ a lb.?
13. Bought 3 yards and $3\frac{3}{4}$ yards at $\$1\frac{1}{3}$ a yard. Find the cost.
14. What is the difference between 48 hundredths and 5 tenths?
15. A farmer's account-book showed the following items:—"Sold 2 tubs butter, each 55 lbs., at 19 cents; 15 bushels potatoes at $\$1$; 5 barrels apples at $\$2.75$; 3 young pigs at $\$3.25$ each. Paid for groceries $\$12.68$; for wages $\$18$; for other things $\$9.55$." Did he gain or lose, and how much?
16. How much will 25 carpenters earn in a day, working 8 hours, at $\$1\frac{1}{3}$ an hour?
17. How many times is $\frac{1}{5}$ contained in 85?

18. How much greater is $\frac{2}{3}$ than $\frac{3}{20}$?
19. How many can be fed for \$20, if the dinner of each cost $33\frac{1}{3}$ cents?
20. How many pieces $2\frac{1}{2}$ feet long can be cut from 100 feet of string?
21. The difference of two numbers is $14\frac{3}{8}$ and the greater $19\frac{1}{4}$. Find the smaller.
22. Find the sum of $\frac{1}{3}$ and $\frac{5}{6}$; find their difference; divide the sum by the difference.
23. Divide $8\frac{7}{8}$ by the difference between $5\frac{1}{2}$ and $3\frac{3}{4}$.
24. The divisor is 5, the quotient $3\frac{1}{2}$. What is the dividend?
25. The quotient is $1\frac{1}{2}$, the dividend is 10. Find the divisor.
26. A farmer has 16 sheep at \$4 $\frac{2}{3}$ a head. What change must he give back out of \$100?
27. At \$ $\frac{1}{3}$ a yard, how many yds. can be bought for \$25?
28. If $\frac{3}{10}$ of a yard cost 60 cents, how much is that for $\frac{7}{10}$ yard?
29. If $\frac{2}{3}$ of a bushel of apples cost a dollar, what will $\frac{5}{6}$ of a bushel cost?
30. How many lbs. of tea can be bought for \$8.10, if $\frac{7}{10}$ of a lb. cost 63 cents?
31. Multiply the sum of $\frac{5}{10}$ and $\frac{3}{4}$ by their difference.
32. Having a certain sum of money, I divide it into six equal parts, and give George $\frac{3}{4}$ of one of the parts. What fraction of the whole has George? If he receives 9 cents, what amount of money had I?
33. A woman can hoe a patch of potatoes in 4 hours, and a boy can do the same work in 5 hours. What part of the work can the woman do in one hour? What part can the boy do? What part can both together do? How many hours will it take both together to do the work?

34. A can do a piece of work in 6 days, B in 4. In how many days can they do it together?

35. Which would you rather be, one of three persons to receive \$7 to be divided, or one of four persons to receive \$9? How much more would you get in the one case than in the other?

C

1. $2\frac{3}{4} \times 8$.
2. $9\frac{3}{4} \times 5$.
3. $57\frac{2}{3} \times 11$.
4. $20 \times 23\frac{7}{8}$.
5. $30 \times 11\frac{1}{2}$.
6. $18 \times 12\frac{1}{4}$.
7. $3\frac{5}{6} \times \frac{9}{25}$.
8. $4\frac{1}{7} \times \frac{7}{6}$.
9. $7\frac{3}{4} \times \frac{5}{8}$.
10. $\frac{6}{7} \times \frac{7}{5}$.
11. $13\frac{1}{4} \times 1\frac{3}{4}$.
12. $8\frac{1}{2} \times \frac{5}{4}$.
13. $\frac{9}{10}$ of $1\frac{4}{5}$.
14. $\frac{2}{7}$ of $5\frac{1}{4}$.
15. $9\frac{9}{11} \times \frac{3}{10}$.
16. $1\frac{3}{4} \times \frac{1}{1\frac{3}{5}}$.
17. $8\frac{1}{5} \times 4\frac{3}{8}$.
18. $1\frac{1}{5} \times 1\frac{1}{4}$.
19. $12\frac{3}{8} \times 1\frac{5}{11}$.
20. $5\frac{3}{4} \times 3\frac{3}{11}$.
21. $\frac{2}{7} \times \frac{1}{4}$.
22. $22\frac{2}{11} \times 4\frac{2}{5}$.
23. $\frac{3}{8}$ of 32.
24. $\frac{5}{33}$ of 22.
25. $\frac{1}{15}$ of 35.
26. $1\frac{1}{10}$ of 45.
27. $13\frac{5}{8} \times 27$.
28. $2005 \times 9\frac{1}{4}$.
29. $216 \times 7\frac{4}{9}$.
30. $504 \times 8\frac{5}{7}$.
31. $\frac{2}{3} \div 11$.
32. $\frac{7}{11} \div 6$.
33. $\frac{1}{3} \div 16$.
34. $\frac{1}{7} \div 18$.
35. $\frac{3}{4} \div 21$.
36. $15 \div \frac{3}{4}$.
37. $10 \div \frac{5}{7}$.
38. $21 \div 1\frac{4}{5}$.
39. $23 \div 1\frac{7}{10}$.
40. $1 \div 1\frac{1}{2}$.
41. $4\frac{2}{3} \div 5$.
42. $3\frac{1}{2} \div 7$.
43. $2\frac{5}{8} \div 6$.
44. $13\frac{9}{10} \div 13$.
45. $19\frac{1}{3} \div 8$.
46. $\frac{9}{17} \div \frac{3}{4}$.
47. $\frac{1}{3} \div \frac{4}{7}$.
48. $\frac{4}{8} \div \frac{9}{4}$.
49. $\frac{2}{8} \div \frac{7}{15}$.
50. $\frac{3}{12} \div \frac{6}{8}$.
51. $1 \div 8\frac{1}{4}$.
52. $10\frac{1}{5} \div 3\frac{1}{3}$.
53. $3\frac{3}{4} \div 7\frac{1}{2}$.
54. $1\frac{9}{10} \div 2\frac{3}{5}$.
55. $5\frac{3}{4} \div 1\frac{5}{12}$.
56. $12\frac{3}{4} \div 3\frac{3}{8}$.
57. $11\frac{1}{8} \div 16\frac{5}{8}$.
58. $10\frac{1}{4} \div 1\frac{5}{14}$.
59. $16\frac{1}{8} \div 5\frac{3}{4}$.
60. $4 \div 18\frac{9}{10}$.
61. $\frac{5}{6}$ of $\frac{9}{10} \div \frac{5}{8}$.
62. $\frac{4}{5}$ of $\frac{1}{10} \div 1\frac{5}{12}$.
63. $\frac{5}{6}$ of $\frac{7}{10} \div 7\frac{1}{8}$.
64. $\frac{9}{11}$ of $\frac{1}{8} \div 1\frac{1}{4}$.
65. $\frac{2}{7} \div (\frac{3}{7} \text{ of } \frac{5}{6})$.
66. $\frac{2}{7}$ of $\frac{3}{8}$ of $5\frac{1}{4}$.
67. $\frac{3}{10}$ of $\frac{7}{15}$ of $9\frac{9}{14}$.
68. $\frac{7}{11}$ of $13\frac{3}{8}$ of $5\frac{8}{10}$.
69. $1\frac{1}{2} \times 34\frac{3}{10} \times 1\frac{5}{6}$.
70. $\frac{9}{10}$ of $\frac{1}{5}$ of $1\frac{1}{8}$.
71. $(1\frac{1}{2} + \frac{2}{3}) \times \frac{4}{5}$.
72. $(2\frac{5}{8} + 1\frac{1}{8}) \div 1\frac{1}{2}$.
73. $(\frac{3}{4} - \frac{1}{6}) \div 1\frac{1}{2}$.
74. $(\frac{3}{8} - \frac{1}{4}) \div 1\frac{3}{5}$.
75. $(\frac{3}{8} + \frac{2}{3}) \div \frac{5}{10}$.
76. $(1\frac{5}{6} + 2\frac{2}{3}) \div 5\frac{1}{6}$.
77. $(2\frac{5}{8} + 3\frac{5}{12}) \times 9\frac{3}{5}$.
78. $(2\frac{1}{3} + 2\frac{1}{4}) \times 1\frac{3}{4}$.

79. $(2\frac{1}{4} - \frac{1}{8}) \times \frac{3}{4}$. 85. $\frac{1}{8}$ of $(2\frac{1}{4} - \frac{3}{8})$.
 80. $(1\frac{3}{8} - \frac{8}{9}) \div 4\frac{1}{2}$. 86. $(2 + \frac{1}{4}) \div \frac{3}{8}$.
 81. $1\frac{1}{2} \times 1\frac{1}{4} \times 1\frac{1}{3}$. 87. $(8\frac{1}{2} - 3\frac{1}{4}) \div 8\frac{7}{8}$.
 82. $2\frac{1}{2}$ of $1\frac{1}{4} \times 2\frac{1}{10}$. 88. $1\frac{1}{3} \div (5\frac{3}{8} - 3\frac{1}{4})$.
 83. $2\frac{1}{2}$ of $(3\frac{1}{3} - 2\frac{5}{6})$. 89. $(8\frac{3}{8} - 5\frac{5}{8} \div 7\frac{1}{2})$.
 84. $\frac{3}{8}$ of $(\frac{1}{3} + \frac{1}{6})$. 90. $1 \times \frac{1}{3} \div 2$.

TEST EXERCISE.

Prove objectively that:—

1. $\frac{2}{3}$ of $1 = \frac{1}{3}$ of 2. 5. $\frac{3}{8} \times 3 = \frac{9}{8}$.
 2. $\frac{2}{4} = \frac{6}{12} = \frac{1}{2}$. 6. $\frac{3}{8} \times 3 = \frac{9}{8}$.
 3. $2\frac{3}{4} = \frac{11}{4}$. 7. $\frac{3}{4}$ of $\frac{4}{5} = \frac{3}{5}$.
 4. $\frac{1}{3}$ is greater than $\frac{1}{4}$. 8. $1 \div \frac{2}{3} = 1\frac{1}{2}$.

DEFINITIONS, &C.

1. What is a fraction?

Ans. A fraction is one or more of the equal parts into which the unit has been divided.

2. From what do fractions arise?

Ans. From *division*, the *numerator* being the *dividend* and the *denominator* the *divisor*.

3. What is the *value* of a fraction?

Ans. The *quotient* of the numerator divided by the denominator. Thus the value of $\frac{2}{4}$ is 2.

4. Into what two classes are fractions divided according to their value?

Ans. *Proper* fractions and *improper* fractions.

5. What is a *proper* fraction?

Ans. One whose value is *less than a unit*.

6. What is an *improper* fraction?

Ans. One whose value is *equal to or greater than a unit*.

7. What is $5\frac{1}{2}$ called, and what is its value?

Ans. A *mixed number*. Its value is $5 + \frac{1}{2}$.

8. What is the *denominator* ?

Ans. The denominator is the *name* of the equal parts into which the unit has been divided. It also shows the *number* of equal parts.

9. What does the numerator show ?

Ans. The numerator shows the *number* of equal parts taken to form the fraction.

10. What are the numerator and denominator called

Ans. The *terms* of the fraction.

11. What is the effect if the terms of a fraction are both *multiplied*, or both *divided* by the same number ?

Ans. The *value* remains *unchanged*.

12. How is a fraction changed (reduced) to *higher* terms ?

Ans. By *multiplying* both numerator and denominator by the same number.

13. How is a fraction reduced to *lower* terms ?

Ans. By *dividing* both numerator and denominator by the same number.

14. When are fractions called *similar* or *like* ?

Ans. When they have the same *denominator* or *name*.

15. Previous to what operations must *unlike* fractions be made *similar* ?

Ans. Before *adding* them, before *subtracting* them and before *comparing* them.

16. How are similar fractions added or subtracted ?

Ans. By adding or subtracting their *numerators*.

17. If fractions have the same denominator, which is the *greatest* ?

Ans. That which has the *greatest numerator*.

18. If fractions have the same *numerator*, which is the *greatest*?

Ans. That which has the *least denominator*.

19. In what two ways may a *fraction* be *multiplied*?

Ans. By *multiplying* the *numerator* or by *dividing* the *denominator*.

20. In what two ways may a *fraction* be *divided*?

Ans. By *dividing* the *numerator* or by *multiplying* the *denominator*.

21. Which is the shorter method in each case? *Why*?

Ans. The method of *division*, because it uses *cancellation*.

22. What is *cancellation*?

Ans. Cancellation is the striking out of *common factors* from both *numerator* and *denominator*.

23. On what *principle* does it depend?

Ans. On the principle that the value of a *fraction* is not altered, when its terms are both divided by the same number.

24. With what other *process* is it identical?

Ans. Reducing to *lowest terms*.

25. State a general rule for multiplying fractions.

Ans. Write the *product* of the *numerators* over the *product* of the *denominators*.

26. State a general rule for dividing fractions.

Ans. *Invert* the *divisor* and proceed as in *multiplication*.

27. What is the force of the word *of*, when placed between fractions?

Ans. It has the force of $\times$, the *sign* of *multiplication*.

28. What are fractions connected by "*of*" called?

Ans. *Compound fractions*.

CHAPTER IV.

DECIMALS.

Thousands	Hundreds	Tens	Units		Tenths	Hundredths	Thousandths
8	4	6	5		9	1	3
Integers.					Fractions.		

XLIV. (Oral.)

1. What is Decimal Notation? How does the place-value of a figure increase? (Book I. p. 50).
2. What numbers are represented by 24, 109, 8465? What is the place-value of each figure in these numbers? Counting from the right, how many places *up* is it?
3. Examine the number, 8465.913. We have marked the place of units by a point put after it and written other figures after the point. The point is called the *decimal point* and the figures after it are *decimal fractions*.
 - (a) Integers are separated from fractions by the decimal point; figures to the left being integers, those to the right fractions.
 - (b) Counting from the decimal point orders of decimal fractions decrease on the scale of ten. The value of a figure *one place down* is *tenths*, *two places down* *hundredths*, *three places down* *thousandths*, etc.
4. In the following numbers separate integers from fractions, and give the place-value of each figure, integral or fractional:—0.7; 0.65; 2.3; 37.5; 425.312; 40.7; 0.055; .1487; .0005; 100.306.

5. Define a *decimal fraction*.

Ans. A decimal fraction is one in which the unit is divided into *tenths, hundredths, thousandths*, etc.

6. In writing a decimal fraction which part only is expressed?

7. Upon what does the value of a figure depend?

Ans. Upon the place it occupies counting from the decimal point.

8. Which is greater $\cdot 1$ or $\cdot 01$? $\cdot 1$ or $\cdot 001$? $\cdot 01$ or $\cdot 001$? $\cdot 1$ or $\cdot 9$? $\cdot 1$ or $\cdot 09$? 1 or $\cdot 99$?

9. How many times greater is 1 than $\cdot 1$? 1 than $\cdot 01$? 1 than $\cdot 001$? $\cdot 1$ than $\cdot 01$? $\cdot 1$ than $\cdot 001$? $\cdot 01$ than $\cdot 001$?

10. If you move the decimal point from any place to the next place on its *left*, do you multiply or divide the fraction? How many times?

11. If you move the decimal point from any place to the next place on its *right*, do you multiply or divide the fraction? How many times?

12. Multiply $\cdot 3$, $\cdot 03$, $\cdot 003$, $\cdot 0003$ each by 10 .

13. Divide 4 , $\cdot 4$, $\cdot 04$, $\cdot 004$ each by 10 .

XLV.

1. Read (or write):—

$\cdot 2$.	$\cdot 29$.	$\cdot 37$.	$\cdot 002$.	$\cdot 005$.	$\cdot 579$.
$\cdot 02$.	$\cdot 31$.	$\cdot 08$.	$\cdot 451$.	$\cdot 017$.	$\cdot 057$.

2. How do you find the denominator of a decimal fraction?

Ans. It is 1 with as many ciphers added as there are decimal places in the numerator.

3. Read (or write):—

$1\cdot 17$.	$82\cdot 03$.	$8\cdot 006$.	$\cdot 6452$.	$24\cdot 0009$.
$4\cdot 71$.	$91\cdot 75$.	$4\cdot 0731$.	$\cdot 4239$.	$14\cdot 7525$.

4. Write as decimals: 4 tenths, 6 tenths, 7 tenths, 3 tenths, 9 tenths, 10 tenths.

5. Write as decimals: 3 hundredths, 5 hundredths, 6 hundredths, 8 hundredths, 10 hundredths, 17 hundredths, 57 hundredths, 92 hundredths.

6. Write as decimals: 5 thousandths, 55 thousandths, 555 thousandths, 6 thousandths, 16 thousandths, 629 thousandths.

7. Write as decimals:—

$1\frac{7}{10}$	$1\frac{20}{100}$	$1\frac{66}{100}$	$17\frac{55}{1000}$	$25\frac{3}{100}$	$19\frac{82}{1000}$
$1\frac{3}{10}$	$4\frac{9}{10}$	$16\frac{1}{100}$	$20\frac{17}{1000}$	$33\frac{1}{100}$	$344\frac{5}{1000}$

8. Read, giving separately the units, tenths, hundredths and thousandths:—

2.	2·20.	2·222.	49·713.	2·2.
·2.	2·22.	56·47.	151·806.	11·08.

9. Express decimally: Two *and* three tenths; four *and* five hundredths; seven *and* nine thousandths; fifteen *and* twenty-seven hundredths; seventy *and* six hundred seventy thousandths; twenty-five *and* eleven ten-thousandths; three *and* four hundred fifty-one thousandths; three hundred *and* fourteen hundredths.

10. Combine and write in decimal form:—

- (a) 1 unit, 1 tenth, 1 hundredth.
- (b) 7 units, 4 tenths, 3 hundredths.
- (c) 4 tenths, 5 hundredths, 7 thousandths.
- (d) 6 hundredths, 2 thousandths.
- (e) 9 units, 9 thousandths.
- (f) 6 units, 3 hundredths.

11. In the number 22·222 give the value of each figure. How much greater is the first figure on the left than the second? Than the third? Than the fourth? Than the fifth?

12. Compare the value of 5 and $\cdot 5$; of 6 and $\cdot 06$; of $\cdot 6$ and $\cdot 006$.

13. Compare $\cdot 5$ and $\cdot 50$; $\cdot 50$ and $\cdot 500$. What effect is produced by adding a cipher to the decimal?

XLVI.

A

1. Write as decimals and add:—

(a) 6 tenths of a dollar, 3 tenths of a dollar, 9 tenths of a dollar.

(b) 7 tenths of a dollar, 26 hundredths of a dollar, 729 thousandths of a dollar.

(c) $\$ \frac{7}{10}$, $\$ \frac{1}{100}$, $\$ \frac{11}{1000}$, $\$ \frac{825}{10000}$, $\$ \frac{24}{1000}$.

(d) $\$ 2 \frac{1}{10}$, $\$ 19 \frac{17}{100}$, $\$ 207 \frac{9}{1000}$, $\$ 472 \frac{99}{1000}$.

(e) One-tenth, one-hundredth, one-thousandth.

2. How many tenths are there in a unit?

3. Fifteen tenths are how many units and tenths? Express as a decimal.

4. Twenty-six tenths are how many units and tenths? Write as a decimal.

5. Add 45 tenths, 45 hundredths, 45 thousandths.

6. Add 111 tenths, 111 hundredths, 111 thousandths.

7. Add 4 units, 40 tenths, 40 units, 40 thousandths.

B

Find the value of:—

1. 3 tenths + 7 millionths + 51 thousandths.

2. 61 tenths + 15 hundredths + 12 ten-thousandths.

3. 7 hundredths + 11 millionths + 113 hundred-thousandths.

4. 51 millionths + 51 hundredths + 51 tenths.

5. 1001 thousandths + 101 hundredths + 11 tenths.

6. $2\cdot4 + 3\cdot14 + 3\cdot6 + 9\cdot12 + 8\cdot04$.

7. $\cdot 123 + \cdot 247 + \cdot 316 + \cdot 92 + \cdot 58$.
8. $\cdot 7163 + \cdot 951 + \cdot 216 + \cdot 035 + \cdot 6926$.
9. $51\cdot 7 + 7\cdot 8 + 5\cdot 936 + 72\cdot 31 + 61\cdot 3 + 204$.
10. $92\cdot 18 + 76\cdot 95 + 576\cdot 03 + 596\cdot 37 + \cdot 031$.
11. $1\cdot 03 + 5\cdot 007 + \cdot 051 + \cdot 0175 + \cdot 256$.
12. $5\cdot 071 + 371\cdot 51 + \cdot 0013 + \cdot 015 + 2\cdot 0158$.
13. $7\cdot 0021 + 15\cdot 376 + \cdot 00195 + 7\cdot 308 + 3\cdot 1032$.
14. $\cdot 0313 + 32\cdot 156 + \cdot 0212 + 7\cdot 308 + 7\cdot 39 + 73\cdot 9$.

XLVII.

A

1. From a unit take one tenth, seven tenths, eleven hundredths, eight hundredths, thirty-four thousandths.
2. Find the difference between five tenths and two hundred twenty eight thousandths.
3. What is 5 hundredths minus 50 thousandths?
4. From 1 take $\cdot 9$, $\cdot 09$, $\cdot 99$.
5. Is $\cdot 3$ or $\cdot 8$ nearer to $\cdot 5$? By how much?
6. Which is nearer to the unit, $1\cdot 7$ or $\cdot 3$?
7. From three *and* twenty-nine hundredths take fifty-three ten-thousandths.
8. From $6\frac{4}{1000}$ take $5\frac{3}{100}$.
9. From $\cdot 543$ take $\frac{5}{100} + \frac{4}{1000} + \frac{3}{10000}$.

B

Find the value of:—

- | | |
|-----------------------------------|---|
| 1. $\cdot 62 - \cdot 45$. | 8. $1\cdot 00053 - \cdot 00068$. |
| - 2. $\cdot 5 - \cdot 047$. | 9. $3\cdot 00762 - 1\cdot 008937$. |
| 3. $3\cdot 15 - 1\cdot 68$. | 10. $1 - \cdot 996079$. |
| 4. $3\cdot 75 - \cdot 375$. | 11. $10 - \cdot 820571$. |
| - 5. $29\cdot 1 - 7\cdot 77605$. | 12. $15 - 5\cdot 8461$. |
| - 6. $1 - \cdot 007136$. | 13. $\cdot 87\frac{1}{2} - \cdot 66\frac{3}{4}$. |
| - 7. $4 - \cdot 04$. | 14. $\cdot 83\frac{1}{3} - \cdot 37\frac{1}{2}$. |

XLVIII.**A (Oral).**

50. 5. .5. .05. .005. 50.5. 5.5.

1. Multiply each of the above numbers by 13, by 100, by 1000.

2. Divide each of the above numbers by 10, by 100, by 1000.

3. Multiply each of the above numbers by .1, by .01, by .001.

B (Oral).**A****B****C****D**

$\cdot 6 \times 3.$

$\cdot 03 \times 10.$

$\cdot 03 \times \cdot 2.$

$300.9 \times 10.$

$\cdot 3 \times 5.$

$\cdot 604 \times 100.$

$\cdot 08 \times \cdot 7.$

$8 \times \cdot 12.$

$\cdot 7 \times 9.$

$\cdot 66.3 \times 10.$

$\cdot 01 \times \cdot 01.$

$\cdot 101 \times 11.$

$\cdot 08 \times 4.$

$\cdot 7 \times \cdot 7.$

$\cdot 07 \times \cdot 05.$

$\cdot 6.5 \times \cdot 4.$

$\cdot 004 \times 6.$

$\cdot 25 \times \cdot 8.$

$\cdot 25 \times 2.$

$\cdot 0001 \times 1000.$

C

Find the value of:—

1. $92.05 \times 12.$

9. $3.157 \times \cdot 9.$

2. $\cdot 0121$ of 154.

10. $\cdot 29 \times \cdot 68.$

3. $\cdot 0032 \times 24.$

11. $\cdot 0587 \times 2.11.$

4. $8.09 \times 265.$

12. $3.102 \times 31.02.$

5. $30.56 \times 121.$

13. $\cdot 0021 \times \cdot 07.$

6. $\cdot 89$ of 100.

14. $56.802 \times 1.09.$

7. $\cdot 75$ of 383.

15. $4.44 \times \cdot 044 \times 54.4.$

8. $65 \times 7.62.$

16. $1.02 \times 102 \times 10.2 \times \cdot 102.$

D

1. 13 barrels at \$3.375 a barrel.

2. $\cdot 7$ of \$38.45.

3. $\cdot 079$ of \$120.

4. $\cdot 90\frac{1}{4}$ of \$160.48.

5. $\cdot 179$ of a ton at \$92 a ton.

6. 6.85 tons at \$74.87 $\frac{1}{2}$ a ton.
7. 3.4 lbs. at \$0.73 a lb.
8. 9.75 cwt. at \$2.47 a cwt.
9. Which of the two numbers, .5764 and .5757, is nearer to .576, and by how much?

XLIX.

A (*Oral*).

1. Divide .36 by 2, 3, 4, 5, 6, 8, 9 separately.
2. Find separately $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{9}$ of 3.6.
3. How often is .2, .3, .4, .5, .6, .8, .9 contained in .36?
4. Divide 7.2 by .02, .03, .004, .6, .8, .9.
5. $5 \div .5$ $3.8 \div 10$ $2.25 \div 100$
 $.08 \div 4$ $16 \div .8$ $.16 \div .008$

B

Find the quotient of:—

1. .00632 $\div$ 8.
2. 67.5004 $\div$ 11.
3. 12.08 $\div$ 64.
4. .1725 $\div$ 750.
5. 2.25 $\div$.015.
6. 8 $\div$.0064.
7. 11.002 $\div$.0032.
8. 3 $\div$.0075.
9. 130.2 $\div$ 2.5.
10. 100.13 $\div$ 4.75.
11. 28.3696 $\div$ 1.49.
12. .0001 $\div$ 1000.
13. 351 $\div$.00001.
14. .00052 $\div$.032.
15. 6.3 $\div$.00045.
16. 415.09958 $\div$.098.

C

Find the quotient to five decimal places, if necessary, of:

1. 274.6 $\div$ 3.672.
2. 89.2 $\div$.0074.
3. 16 $\div$.0004.
4. 21546.872 $\div$.054.
5. 34.952 $\div$ 53.07.
6. .06286 $\div$ 73.9.
7. 721.42 $\div$ 21.9.
8. .169 $\div$ 13,130,0013.
9. 91.6 $\div$ 8931.61.
10. 43.2 $\div$.0351.

L. (Review.)

A

1. Subtract $.7854 + .9685$ from 10.
2. Multiply $.637 + .58 + 3.0456$ by $.067$.
3. Divide $.092 - .0056625$ by $.708 + .6734$.
4. Multiply $1.304 - .5672$ by $.00045$.
5. The dividend is $.000005372$ and the quotient is $.00632$. Find the divisor.
6. The product is 488 and the multiplier 7.625 . Find the multiplicand.
7. Subtract $3.07 + 25.9 + 44.123 + 8.75$ from $100 - .189$.
8. Divide $.8 + .16$ by $.4$.
9. Multiply $1 - .907$ by $54.3 - 6.942$.
10. Divide the difference between $.8$ and $.15$ by $.05$.
11. Divide $.7 - .12$ by $.4$.
12. $1 - .05 - .5 - .005$.
13. $1 - .5 - .05 - .45$.
14. $1 - .005 - .0004$.
15. $1 - (.005 + .095)$.

B

1. What will be the weight of 16 boys, if the average weight of each is 80.875 lbs.?
2. A person bought 500 cords of wood at $\$4.375$ a cord, and sold it $\$5.15$ a cord. What profit did he make?
3. A man whose weekly wages are $\$8.625$ saves $.2$ of that amount every fortnight. In how many weeks will he save $\$34.50$?
4. Cost of 66.75 barrels at apples at $\$3.125$ a barrel?
5. From a piece of cloth containing fifty yards, twenty-four and eighty-five thousandths yards were cut. How much was left?

6. There are 5·5 yards in a rod. How many rods in a mile (1760 yards)?
7. There are 30·25 square yards in a square rod. How many square rods in an acre (4840 square yards)?
8. If 2·9 barrels of flour cost \$17·4, what will 7·8 barrels cost?
9. If ·55 of a ship is worth \$12,100, what is the value of the whole?
10. I walk 19·14 miles in 4·64 hours. How far do I walk in an hour?
11. Divide 24,000 acres among four farmers, giving ·3756 to one, ·3421 to another, and ·1573 to the third. How many acres will remain for the fourth?
12. Having lost ·3627 of my money, and spent ·2351 on a house, I have \$10,055 left. How much had I at first?

C (Oral).

1. From 15 take 7·5.
2. Value of ·2 of 5 lbs.
3. ·025 + ·125 + ·75.
4. ·5 of \$1.
5. 1·14 - ·9.
6. ·005 × 100.
7. ·05 × 150.
8. ·5 × 100.
9. ·1 ÷ 20.
10. I own ·1 of a farm. What part belongs to others?
11. I own ·1 of a farm and sell ·1 of my share. What part of the farm do I sell? What part of the farm do I still own?
12. Cost of 3·2 articles at \$4 each?
13. At 2 cents each, how many oranges for \$.8?
14. 2·5 lbs. mutton at \$.08?
15. Sold ·3 and ·4 of a box of tea. What left?

LI.

1. Cost of 500 lbs. of beef at \$8.60 per cwt. (100 lbs.)? Cost of 50 lbs.? Of 850 lbs.? Of 437 lbs.? Of 245 lbs.?
2. Cost of 18,000 feet of boards at \$16 a thousand? Of 1800 feet? Of 16,845 feet?
3. Cost of 3436 roofing slates at \$58 a thousand?
4. Cost of 1545 shingles at \$.625 a hundred?
5. At \$11.75 a thousand, what will 20,650 oranges cost?
6. At \$5.60 a thousand, what will 10,500 envelopes cost?
7. At \$8 a hundred, what will 3450 lbs. sugar cost?
8. At \$13.00 a hundred, what will 970 pine apples cost?
9. At \$1.25 a hundred, what will 580 oysters cost?
10. What must a contractor pay for the following material:—35,850 bricks at \$8.40 a thousand; 12,630 feet of boards at \$32.50 per thousand feet; 4560 slates at \$8.20 a hundred; 8360 laths at \$0.40 a hundred?

LII.

A

Express as decimals:—

A	B	C	D	E	F
$\frac{1}{2}$.	$\frac{1}{4}$.	$\frac{3}{4}$.	$\frac{7}{8}$.	$3\frac{1}{16}$.	$17\frac{1}{80}$.
$\frac{1}{5}$.	$\frac{7}{8}$.	$\frac{1}{5}$.	$\frac{1}{10}$.	$4\frac{1}{4}$.	$26\frac{3}{32}$.
$\frac{3}{5}$.	$\frac{3}{8}$.	$\frac{5}{8}$.	$\frac{1}{100}$.	$9\frac{7}{80}$.	$40\frac{6}{100}$.

B

Express as decimals as far as five decimal places:—

A	B	C	D	E
$\frac{1}{3}$.	$\frac{1}{4}$.	$\frac{5}{6}$.	$\frac{8}{9}$.	$3\frac{1}{2}$.
$\frac{2}{3}$.	$\frac{3}{4}$.	$\frac{1}{3}$.	$\frac{10}{9}$.	$\frac{1}{2}$.
$\frac{1}{6}$.	$\frac{1}{11}$.	$\frac{1}{30}$.	$\frac{11}{91}$.	$3\frac{1}{2}$.

LIII.

Express as common fractions in their lowest terms:—

A	B	C	D	E	F
.5.	.25.	.125.	17.6.	.003.	.0875.
.2.	.75.	.375.	9.18.	.008.	.3125.
.1.	.01.	.625.	5.85.	.275.	.4.032.
.3.	.42.	.875.	15.15.	.004.	6.135.

LIV.

1. Prove and commit to memory:—

A	B	C	D
$\frac{1}{2} = .5.$	$\frac{1}{8} = .125.$	$\frac{7}{8} = .875.$	$\frac{1}{5} = .2.$
$\frac{1}{4} = .25.$	$\frac{3}{8} = .375.$	$\frac{1}{3} = .33\frac{1}{3}.$	$\frac{1}{10} = .1.$
$\frac{3}{4} = .75.$	$\frac{5}{8} = .625.$	$\frac{2}{3} = .66\frac{2}{3}.$	$\frac{1}{100} = .01.$

2. Represent each of the above as the fraction of a dollar, and express its value in cents (*e.g.*, $\$ \frac{1}{2} = \$ \cdot 5 = 50$ cents).

LV.

A

(Before working, change common fractions to decimals.)

1. From a fifty-dollar bill three accounts of $\$13\frac{1}{2}$, $\$18\frac{3}{4}$ and $\$15\frac{1}{4}$ were paid. How much was left?
2. Arrange in order of magnitude, $\cdot 37$, $\frac{2}{3}$, $\frac{4}{5}$, $\cdot 368$.
3. Add $\cdot 0356$, $\frac{1}{125}$, $2\frac{1}{4}$.
4. Add $7\cdot 065$, $\cdot 28$, $3\frac{13}{100}$, $\cdot 083$, $\frac{3}{4}$.
5. From $687\frac{11}{12}$ take $679\cdot 0875$.
6. From $\frac{1}{120}$ take $\cdot 00093455$.
7. $\frac{2}{3} + 1\frac{3}{4} + \frac{1}{10} + \frac{9}{100}$.
8. $3\frac{9}{10} + 2\frac{2}{3}$.
9. $4\frac{3}{4} + 1\cdot 2\frac{1}{8} + 5\cdot 8\frac{3}{4} + \cdot 635\frac{3}{4}$.
10. $\$3\frac{1}{4} + \$3\frac{3}{8} + \$8\cdot 11 + \$10\cdot 6\frac{1}{4}$.
11. Multiply the sum of $\frac{1}{10}$ and $\frac{1}{5}$ by their difference.
12. Subtract $\cdot 1875$ of $3\frac{1}{4}$ from $\cdot 75$ of $1\frac{1}{2}$.

B (Oral).*(Before working, change decimals to common fractions.)*

1. 9 articles at \$.125 each.
2. 3 lbs. tea at \$.875 a lb.
3. 9 lbs. coffee at \$.33 $\frac{1}{3}$ a lb.
4. .625 of 40 acres.
5. .66 $\frac{2}{3}$ of the minutes in an hour.
6. .1 of the seconds in a minute.
7. .01 of \$5.
8. Cost of .25 of a lb. at 80 cents a lb.
9. Cost of .2 of 10 yards at 10 cents a yard.
10. .5 of 50 is how many more than .75 of 20?

C*(Before working, change decimals to common fractions.)*

1. Subtract $\frac{3}{4}$ from 1.1 and divide the result by .1.
2. After spending .6 of my money and losing $\frac{1}{10}$, I have \$21 left. What had I originally?
3. I ride 26.625 miles on the first day, and 24 $\frac{5}{8}$ miles on the second. How far must I ride on the third to complete a journey of 70 miles?
4. In an orchard .25 of the trees are pear trees, .33 $\frac{1}{3}$ apple trees and .2 plum trees. If, besides, there are 39 cherry trees, how many trees are in the orchard?
5. Multiply the quotient of 1.5 and .075 by the quotient of 3.25 and 2 $\frac{1}{8}$.
6. Multiply together $1\frac{3}{8}$, 3.2, 2.5, $1\frac{1}{4}$.
7. If 7 $\frac{2}{3}$ acres cost \$80, what will 8.625 acres cost?

D*(Work without changing either decimals or common fractions.)*

1. $\frac{3}{4}$ of 32.62.
2. $.387 \times 5\frac{3}{4}$.
3. $6.183 \times 2\frac{1}{4}$.

4. Add $\frac{1}{2}$ of 7.2 to $\frac{3}{4}$ of 6.5, and from the sum take 5 times 1.14.

5. Find $\frac{1}{3}$ of $.375 + .025$.

DEFINITIONS.

1. What is a decimal fraction? (p. 48.)

2. Why called *decimals*?

Ans. From Latin *decem*, which means *ten*, because each figure increases or decreases by the *scale of ten*, according to the place which it occupies; that is, 10 of each lower order make 1 of the next higher.

3. How is a decimal fraction expressed?

4. How do you determine the value of a decimal figure? (p. 49.)

5. What is the value of a digit one place down from the decimal point? Two places down? Three places down?

6. What is the effect of moving the decimal point one place to the left? One place to the right? Two places to the left? Two places to the right?

7. What is the effect of adding a cipher to a decimal fraction? Of removing a cipher from its right?

Ans. The *value* of the decimal is *not changed*.

8. When is it necessary to write the non-significant digit 0?

Ans. When the value of the fraction would be altered by its omission.

CHAPTER V.

COMPOUND QUANTITIES.

TIME.

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (dy.)
7 days	= 1 week (wk.)
365 days	= 1 common year (yr.)
100 years	= 1 century (C.)

The year is divided into 12 calendar months, thus :—

January - - -	31 days.	July - - -	31 days.
February - 28 or 29	"	August . - -	31 "
March - - -	31 "	September -	30 "
April - - -	30 "	October - -	31 "
May - - -	31 "	November -	30 "
June - - -	30 "	December -	31 "

*"Thirty days hath September,
April, June and November."*

LVI.

A (Oral).

1. How many seconds in 1 min.? 2 min.? 5 min.?
2. How many minutes in an hour? 2 hrs.? 6 hrs.?
1 hr. 20 min.? 3 hrs. 40 min.?
3. How many hours in a day? 2 dys. 7 hrs.? 4
dys. 4 hrs.?

COMPOUND QUANTITIES.

4. How many seconds in an hour? min. in a day? hrs. in a week?
5. How many days in 7 weeks? 9 weeks? 6 wks. 5 dys.?
6. How many days in July? In March? In November?
7. How many days in the first two calendar months? The middle two? The last two? The 3rd and the 8th?
8. How many days from June 1 to June 18? To July 1? To July 10? To August 5?
9. How many days from March 20 to April 15? From Jan. 29 to Feb. 22? From Oct. 13 to Nov. 26? From Aug. 15 to Sept. 11?
10. How many months from April 1 to Oct. 1? From Feb. 5 to Sept. 5? From May 29 to Dec. 29?
11. How many minutes in the school session: (a) forenoon, (b) afternoon?
12. How many hours and minutes from 9.30 A.M. to noon? From 11.20 A.M. to 5 P.M.? From 2 P.M. to 7.15 P.M.?

B

1. Reduce 1 dy. 3 hrs. 20 sec. to seconds.
2. " 3 wks. 4 dys. 20 hrs. to minutes.
3. " 1 yr. 3 dys. to seconds.
4. " 20 yrs. 158 dys. 11 hrs. to hours.
5. " a century to days.
6. How many days exactly from Feb. 22, 1888, to Dec. 14 of same year?
7. How many days from April 17, 1895, to Jan. 20, 1896?
8. How many days in the 3 spring months? In the 3 winter months? How many minutes are there in the former more than in the latter?

9. A girl goes to bed at 9.25 P.M. and gets up at 7.40 A.M. How many hours and minutes is she in bed?
 10. How many seconds between noon and midnight?

LVII.

A (Oral).

1. How many minutes in 60 sec.? 120 sec.? 95 sec.? 245 sec.?
 2. How many hours in 60 min.? 84 min.? 360 min.? 500 min.? 3600 sec.?
 3. How many weeks in 14 days? 49 days? 100 days? 365 days? A year?
 4. How many centuries in 500 years? In what year are we now living? In what century? How many years are still required to complete the present century?
 5. How do you reduce sec. to min.? dys. to hours? dys. to weeks? dys. to years? hrs. to years? sec. to hours? Centuries to hours?

B

6. In 82,800 sec. how many hours?
 7. In 416,160 min. how many days?
 8. In 8,029 hours how many weeks?
 9. In 3,198 days how many years?
 10. In 149,904,000 sec. how many years?

LVIII.

Add:—

	hrs.	min.	sec.		yrs.	dys.	hrs.		wks.	dys.	hrs.	min.
1.	17	15	30	2.	7	198	22	3.	2	3	21	42
	8	29	24		6	257	19		1	4	6	39
	3	14	56		4	99	17		3	5	17	25
	10	46	43		5	184	6		5	0	19	16

COMPOUND QUANTITIES.

	hr.	min.	sec.		wks.	dys.	hrs.	min.		mo.	wks.	dys.	hrs.
4.	56	59	24	5.	59	2	18	59	6.	63	3	6	22
	32	22	48		63	5	22	47		49	2	5	18
	64	17	19		48	6	19	34		37	1	4	21
	82	35	59		56	4	10	58		65	3	3	18

Find the difference between: -

	yrs.	dys.	hrs.		hrs.	min.	sec.		yrs.	dys.	hrs.	min.	sec.
7.	440	310	11	8.	22	52	49	9.	14	102	20	31	52
	365	242	4		19	14	54		9	217	23	56	58
	yrs.	mo.	wks.		yrs.	dys.	hrs.		yrs.	dys.	hrs.		
10.	364	9	2	11.	680	320	10	12.	340	210	0		
	118	7	3		456	119	18		288	360	9		

13. From one year take 217 days 19 hrs.

14. From 1 day take 1 minute.

15. What must be added to 48 hrs. 35 min. 35 sec. to make a week?

16. Find in years, months and days the lapse of time between the following dates (*30 days = 1 mo.*):—

April 15, 1881, and Aug. 27, 1834.

Jan. 20, 1893, and May 12, 1875.

March 1, 1890, and Dec. 19, 1840.

Aug. 3, 1905, and July 31, 1647.

LIX.

A (Oral).

- 3 times 50 min.
- 6 " 20 min.
- 5 " 40 sec.
- 3 " 12 hrs.
- 6 " 6 dys.
- 12 " 5 dys.
- 3 " 2 wks. 4 dys.
- 4 " 1 dy. 10 hrs.
- 3 wks. 1 dy. $\div 11$.
- 6 wks. 6 dys. $\div 12$.
- 1 min. 25 sec. $\div 5$.
- 4 min. 10 sec. $\div 50$.
- 2 dys. 12 hrs. $\div 4$.
- 1 dy. 16 hrs. $\div 10$.
- 3 hrs. 20 min. $\div 40$.
- 2 C. 40 yrs. $\div 24$.

wks.	dys.	hrs.
3	6	22
2	5	18
1	4	21
3	3	18

hrs.	min.	sec.
20	31	52
23	56	58

dys.	hrs.
210	0
360	9

5 sec. to
of time

B

1. Multiply 19 hrs. 42 min. 38 sec. by 3.
2. Multiply 5 dys. 13 hrs. 52 sec. by 108.
3. Multiply 5 wks. 4 dys. 18 hrs. by 35.
4. Multiply 2 dys. 4 hrs. 3 min. 27 sec. by 47.
5. Multiply 17 wks. 4 dys. 23 hrs. 47 min. by 56.
6. Multiply 6 yrs. 197 dys. 23 hrs. 34 min. by 98.
7. Divide 92 yrs. 357 dys. 15 hrs. 40 min. by 7.
8. Divide 6263 yrs. 163 dys. 8 hrs. by 200.
9. Divide 21 hrs. 47 min. by 8.
10. Divide 104 dys. 19 hrs. 24 min. 1 sec. by 31.
11. Divide 100 weeks by 77.
12. Divide 10 years by 23.

LX.

A (Oral).

1. How many seconds in a minute? $\frac{1}{2}$ minute?
- $\frac{1}{3}$ min.? $\frac{2}{3}$ min.? $\frac{3}{4}$ min.?
2. How many minutes in $\frac{1}{2}$ hour? $\frac{3}{4}$ hour? $\frac{7}{16}$ hr.?
- $\frac{5}{8}$ hr.? $\frac{11}{16}$ hr.?
3. How many hours in $\frac{1}{8}$ day? $\frac{5}{8}$ dy.? $2\frac{3}{4}$ dys.?
- $6\frac{5}{8}$ dys.? $10\frac{1}{2}$ dys.?
4. $\frac{1}{2}$ min. + $\frac{1}{3}$ min.
5. $\frac{1}{4}$ hr. + 15 min.
6. $2\frac{3}{4}$ hrs. + 20 min.
7. $\frac{5}{8}$ dy. - 7 hrs.
8. $\frac{2}{3}$ dy. - $\frac{1}{4}$ dy.
9. $4\frac{1}{2}$ dys. - $2\frac{3}{8}$ dys.
10. $\frac{2}{7}$ of a week.
11. $\frac{2}{7}$ of 6 wks.

B

Find the value of:—

1. $\frac{5}{16}$ of an hour.
2. $\frac{3}{4}$ of 45 minutes.
3. $\frac{1}{8}$ of a day.
4. $\frac{2}{3}$ of 8 days.
5. $\frac{1}{4}$ of 5 hrs. - $\frac{11}{16}$ of 15 min.
6. $\frac{3}{4}$ dy. + $\frac{5}{8}$ dy. + $\frac{7}{16}$ dy. + $1\frac{1}{8}$ dys.

COMPOUND QUANTITIES.

7. $\frac{5}{8}$ min. + $\frac{4}{5}$ min. + $1\frac{3}{8}$ min. + $3\frac{1}{8}$ min.
8. $\frac{1}{8}$ hr. + $\frac{8}{9}$ of 2 hrs. 30 min. + $3\frac{7}{8}$ hrs.
9. $\frac{2}{3}$ of 5 dys. 4 hrs. 12 min.
10. $\frac{1}{8}$ of 5 dys. 14 hrs. 38 min.
11. $2\frac{1}{2}$ of 3 dys. 3 hrs. 30 min.

LXI.

A (Oral).

1. How many seconds in a minute? .5 min.? .25 min.? .75 min.? $33\frac{1}{2}$ min.?
2. How many minutes in an hour? .1 hr.? .2 hr.? .3 hr.? $66\frac{2}{3}$ hr.?
3. How many hours in .5 dy.? .125 dy.? .375 dy.? .625 dy.?
4. .75 dy. + 15 hrs.
5. .7 min. + .9 min.

B

Find the value of:—

- | | |
|---------------------|--------------------------|
| 1. 0.75 of a day. | 6. 0.75 of a year. |
| 2. 0.5 of a week. | 7. .065235 of a week. |
| 3. 0.25 of a week. | 8. 5.17625 days. |
| 4. 0.085 of a day. | 9. 4.1275 of 12 days. |
| 5. 0.018 of a year. | 10. 11.275075 of a year. |

LXII.

How many times is:—

1. 15 minutes contained in 2 hrs. 20 min.?
2. 1 hr. 17 min. contained in a day?
3. 4 dys. 20 hrs. contained in 3 wks. 40 min.?
4. 3 dys. 4 hrs. 40 min. contained in a year?
5. A gun is fired at intervals of 1 min. 25 sec. How often will it be fired in 3 hrs. 20 min.?
6. How many intervals of 3 hrs. 30 min. in a week?

CAPACITY.



1 gal. 1 qt. 1 pt.

LIQUID MEASURE.

2 pints (pt.) = 1 quart (qt.)

4 quarts = 1 gallon (gal.)



1 bu.

 $\frac{1}{2}$ bu.

1 pk.

 $\frac{1}{2}$ pk.

DRY MEASURE.

2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

In measuring grain, seeds, or small fruits, the measure should be filled to the LEVEL OF THE BRIM. In measuring large fruits and vegetables, the measure should be heaped.

LXIII.

A (Oral).

1. For what purpose is Liquid Measure used?
2. For what purpose is Dry Measure used?
3. What denominations are the same in both?
4. How many denominations in Liquid Measure?

How many in Dry Measure?

5. How many pints make 1 qt.? 2 qts.? 10 qts.?
- $\frac{1}{2}$ qt.? $2\frac{1}{2}$ qts.? 3.5 qts.

6. How many quarts in 3 gal.? 10 gal. 3 qts.?
7. How many quarts in a peck? $2\frac{1}{2}$ pks.? $\frac{1}{4}$ pk.?
75 pk.? 3 pks. 7 qts.?
8. How many pecks in a bushel? qts. in a bu.?
pts. in a bu.?
9. How many pints in a gal.? 1 gal. 2 qts.? 2 gal.
1 qt. 1 pt.?
10. Reduce 3 bu. 3 pks. 3 qts. to pints.
11. How do you reduce gal. to qts.? gal. to pts.?
pts. to gal.?
12. How do you reduce pks. to bu.? pks. to qts.?
bu. to qts.? qts. to bu.?

LXIV.

A (Oral).

1. $8\frac{3}{4}$ gal. milk at 6 cents a qt.?
2. 5 bu. 2 pks. of peas at 40 cents a peck?
3. 16 pints vinegar at 80 cents a gal.?
4. 5 bu. apples at 30 cents for $\frac{1}{2}$ bu.?
5. A pint of milk for $2\frac{1}{2}$ cents. How much per gal.?
6. How many times will a gallon fill a half-pint cup?
7. How many pint bottles will be required to hold 3 gal. 1 qt. of oil?
8. How long will a bushel of oats last a horse, if he gets 3 qts. a day?
9. Bought a bushel of berries for \$2.50, and sold them for 10 cents a qt. What did I gain?

B

1. Reduce to higher denominations:—
80 qts.; 197 pts.; 323 pks.; 317 qts.
2. Reduce to lower denominations:—
 $\cdot 5$ qts.; $\cdot 875$ gal.; $3\cdot 625$ bu.; $\frac{1}{8}$ bu.; $2\frac{5}{8}$ gal.

3. Reduce 48 bu. 3 pks. 5 qts. to pints.
4. In 4079 pints how many gallons?
5. In four bins of corn there are 150 bu. 1 pk. 3 qts.; 163 bu. 1 pk. 1 qt.; 148 bu.; 137 bu. 0 pk. 2 qts. How much corn altogether?
6. From a barrel of cider holding 30 gallons, 19 gals. 2 qts. 1 pt. have been drawn. How much is left?
7. How many dozen bottles, each holding $1\frac{1}{2}$ pints, can be filled from two barrels containing 36 gal. and 54 gal. respectively?
8. Price of 1 bushel of nuts at $\$0.12\frac{1}{2}$ a pint.
9. A dishonest dairyman diluted 72 gal. of milk by adding a gallon of water to every four gallons of milk. He sold the mixture as pure milk at 7 cents a quart, for which offence he was fined \$10. How much money did he lose by his dishonesty?
10. Multiply 54 bu. 3 pks. 4 qts. by 9, and divide the result by 23.
11. Find $\frac{2}{3}$ of 15 gal. 2 qts. 1 pt.
12. Divide 3 pks. 6 qts. 1 pt. by $6\frac{2}{3}$.
13. How often is 2 gal. 1 qt. 1 pt. contained in 36 gal?
14. If 7 bu. 2 qts. of seed is divided into packets containing 4 qts. 1 pt. each, how many packets will there be, and what will be left over?
15. Add $1\frac{1}{2}$ gal., $4\frac{2}{3}$ qts., $6\frac{3}{4}$ gal.
16. Add 3.5 bu., 1.25 bu., .75 pk., 3 pks. 6 qts.
17. From $\frac{9}{16}$ bu. take .3125 bu.
18. Multiply 3 bu. 1 pk. 1 gal. by 24.
19. In two hundred and eleven thousand and twenty pints, how many barrels of 36 gal. each?
20. Find the amount of water poured into a cistern in 11 hrs. 30 min., at the rate of 3 gal. 3 qts. 1 pt. in 90 seconds.

COMPOUND QUANTITIES.

WEIGHT.



AVOIRDUPOIS WEIGHT.

16 ounces (oz.)	=	1 pound (lb.)
100 pounds	=	1 hundredweight (cwt.)
20 cwt. or 2000 lbs.	=	1 ton.

LXV. (*Oral.*)

1. What are weighed by Avoirdupois weight?
2. How many denominations are there? Which is the greatest? Which the least?
3. How many ounces in 2 lbs.? 5 lbs.? $\frac{1}{2}$ lb.? 375 lb.? $\frac{3}{4}$ lb.? $\frac{5}{8}$ lb.? 875 lb.? $1\frac{1}{2}$ lbs.?
4. What part of a lb. is an oz.? 3 oz.? 6 oz.? 4 oz.? 8 oz.? 12 oz.?
5. How many pounds in 32 oz.? 48 oz.? 20 oz.? 24 oz.? 40 oz.? 19 oz.?
6. What part of a cwt. is 10 lbs.? 20 lbs.? 25 lbs.? 50 lbs.? 75 lbs.? Express as common fractions and as decimals.
7. What decimal of a cwt. is 15 lbs.? 29 lbs.? 87 lbs.? 40 lbs.? 7 lbs.? 1 lb.?
8. How many lbs. in a ton? $\frac{1}{20}$ ton? $\frac{1}{4}$ ton? 75 ton? 2 tons? $3\frac{1}{2}$ tons?
9. How many lbs. in 2 cwt.? $4\frac{1}{2}$ cwt.? $5\frac{1}{4}$ cwt.? 525 cwt.? 75 cwt.? 184 cwt.? $87\frac{1}{2}$ cwt.?
10. How many cwt. in 300 lbs.? 450 lbs.? 120 lbs.?
11. How many tons in 4000 lbs.? 6200 lbs.? 8500 lbs.? 9000 lbs.? 10000 lbs.?

LXVI.

A (Oral).

1. At 8 cents a lb., what will 1 cwt. of beef cost? 2 cwt.? 50 lbs.? 25 lbs.?
2. At the rate of \$10 a cwt., what will 20 lbs. cost? 25 lbs.? 80 lbs.? 75 lbs.?
3. Cost of 2 cwt. 25 lbs. at 10 cents a lb.?
4. If hay is \$16 a ton, how many lbs. can be bought for \$8? For \$4? For \$2?
5. If hay is \$20 a ton, what will 4 cwt. cost? $6\frac{1}{2}$ cwt.? 700 lbs.? 950 lbs.? 1764 lbs.?

B

1. Add 3·67 cwt., 7·6 cwt., 10·94 cwt., 13·605 cwt., 9·72 $\frac{1}{2}$ cwt., giving answer in cwt. and lbs.
2. Add 3·87 tons, 2·95 tons, 8·63 tons, giving answer in tons and lbs.
3. Four loads of coal weigh respectively 1840, 2160, 2230 and 2020 lbs. (a) Find the weight in tons and lbs. (b) Find the price at \$6.40 a ton; at 35 cents a cwt.
4. At \$6.50 a ton, what will 6 cwt. 30 lbs. coal cost?
5. Add 6 tons 603 lbs.; 5 tons 407 lbs. 8 oz.; 196 lbs. 15 oz.; 14 tons 1659 lbs. 12 oz.
6. Add 20 lbs. 6 oz.; 16 lbs. 8 oz.; 13 lbs. 9 oz.; 25 lbs. 10 oz.; 19 lbs. 11 oz.; 7 lbs. 13 oz.
7. Add 2 $\frac{1}{4}$ lbs., 3 $\frac{1}{2}$ lbs., 9 $\frac{1}{2}$ lbs., 4 $\frac{7}{16}$ lbs., and 7 lbs. 11 oz.
8. A grocer has 2 barrels of sugar weighing 206 lbs. and 196 $\frac{1}{2}$ lbs. respectively. After selling 1 cwt. 94 lbs. and 1 cwt. 87 lbs. 5 oz., what is left?
9. Multiply 3 lbs. 3 oz. by 2 $\frac{3}{4}$.
10. Divide 3 tons 16 cwt. 19 lbs. by 1 $\frac{1}{2}$.
11. In 67,425 ounces how many cwt.?

COMPOUND QUANTITIES.

12. In 8,420,724 ounces how many tons?
13. In 5 tons 850 lbs. how many ounces?
14. I buy 20 tons 950 lbs. of coal, and it is delivered in loads averaging 19 cwt. 50 lbs. How many loads?
15. In .856 cwt. how many ounces?
16. Find $\frac{1}{4}$ of 12 tons.
17. Find in cwt. the total weight of 33 parcels, each 29 lbs.; 18 parcels, each $17\frac{1}{2}$ lbs.; and 23 parcels, each 16 lbs.
18. Cost of $19\frac{1}{2}$ lbs. of candy at $2\frac{1}{2}$ cents an oz.?

ENGLISH OR STERLING MONEY.

4 farthings	=	1 penny (d.)
12 pence	=	1 shilling (s.)
20 shillings	=	1 pound (£.)

1, 2 and 3 farthings are written as fractions of a penny, $\frac{1}{4}$ d., $\frac{2}{4}$ d., $\frac{3}{4}$ d. respectively.

The standard unit of English money is the £ STERLING, which is represented by a gold coin, called a SOVEREIGN, equal in value to \$4.86 $\frac{2}{3}$.

LXVII.

A (Oral).

1. How many farthings in one penny? $\frac{1}{4}$ d.? $\frac{2}{4}$ d.? 2d.? 8d.? $6\frac{1}{4}$ d.? $7\frac{1}{2}$ d.? $9\frac{3}{4}$ d.?
2. How many pence in 8 farthings? 20 far.? 5 far.? 10 far.? 15 far.
3. How many pence in 2 shillings? 5s.? 1s. 6d.? 2s. 9d.? 4s. 10d.? 8s. 3d.? 3s. 11d.?
4. How many shillings in 36d.? 29d.? 50d.? 73d.? 100d.? £2? £5? £1. 10s.? £4 16s.?
5. How many £ in 40 shillings? 25s.? 70s.? 87s.? 59s.? 91s.?

B (Oral).

1. 3 articles at 6d.	11. 11 articles at 3s.
2. 5 " " 5d.	12. 15 " " 5s.
3. 9 " " 7d.	13. 12 " " 12s.
4. 8 " " 8d.	14. 5 " " 1s. 2d.
5. 2 " " 4½d.	15. 2 " " 2s. 8d.
6. 4 " " 7½d.	16. 4 " " 3s. 6d.
7. 3 " " 8¾d.	17. 10 " " 6s. 6d.
8. 10 " " 3½d.	18. 4 " " £1. 10s.
9. 12 " " 1¾d.	19. 7 " " £2. 5s.
10. 7 " " 5½d.	20. 12 " " £3. 5s.

C

1. In £18. 15s. how many pence?
2. In £114. 16s. 6½d. how many farthings?
3. In £372. 19s. 0¾d. how many farthings?
4. In 30,636 pence how many £?
5. In 40,340 farthings how many £.
6. In 72,155 farthings how many £?
7. Add 3¾d., 2½d., 7¼d., 5½d.
8. 9¾d. + 10½d. + 11¼d. + 3s. 6¾d.
9. 7¾d. + 6½d. + 4¾d. + 11¾d.
10. £10. 10s. 10½d. + £11. 11s. 11¼d. + £3. 13s. 3¾d.
11. £19. 16s. 6¼d. + £25. 3s. 4½d. + £123. 12s. 11¾d. + £1. 1s. 1½d.
12. £1. 19s. + 3s. 9¾d. + £17. 14s. 8d.
13. From £200. 14s. 1d. take £131. 17s. 3½d.
14. From £98. 6s. 2¼d. take £67. 11s. 4¾d.
15. From £10. take 15s. 11¾d.
16. Multiply 1s. 2¼d. by 8.
17. Multiply 2s. 9¾d. by 5.
18. Multiply £25. 11s. 6½d. by 14.

19. Multiply £110. 3s. 9½d. by 35.
20. Find $\frac{1}{4}$ of £1. 5s. 1d.
21. Find $\frac{1}{4}$ of £2. 6s. 1½d.
22. Find $\frac{1}{18}$ of £4. 6s. 3d.
23. Find $3\frac{1}{4}$ of £8. 4s. 4½d.
24. How often is 6d. contained in £3. 7s. 6d.?
25. How often is 1s. 1½d. contained in £9. 6s. 9d.?
26. How often is 6s. 3d. contained in £6. 5s.
27. How often is 5s. 2½d. contained in £24. 14s. 9½d.?

LXVIII.

1. An English sovereign (£1) is worth \$4.86½. Find the exact value of a shilling.
2. Find the exact value of £5, £20, £150.
3. Find the exact value of 6s., 9s., 16s.?
4. Find the exact value of £2. 10s., £10. 2s.
5. The rough estimate of an English sovereign (£1) is \$5; that of a shilling is 25 cents; that of a penny is 2 cents. Write this out as a table and commit to memory.
6. Roughly estimate in dollars and cents:—
 - (a) £10, £50, £88.
 - (b) 2s., 8s., 15s., 19s.
 - (c) 6d., 8d., 2d., 4d., 5d.
 - (d) £4. 8s.; £100. 15s.; £44. 9s.
 - (e) £1. 10s. 6d.; £80. 15s. 7d.
7. Roughly estimate in English money:—\$15, \$18, \$0.75, \$20.50, \$7.80, \$150, \$0.35, \$14.60, \$40.68, \$66.93.
8. By how many cents does the rough estimate of the sovereign and shilling exceed their exact value?
9. Express in Canadian money the difference between the exact value and the rough estimate of £3. 16s.
10. Express in English money the difference between the exact value and the rough estimate of \$43.80.

LENGTH.

LINEAR MEASURE.

12 inches (in.)	=	1 foot (ft.)
3 feet	=	1 yard (yd.)
$5\frac{1}{2}$ yards	=	1 rod (rd.)
320 rods, 1760 yards or 5280 feet	=	1 mile (mi.)

LXIX.

A (Oral).

1. For what purpose is Linear Measure used? What is the meaning of Linear?
2. How many denominations are there? Which is the greatest? Which is the least?
3. Draw a line an inch long; 4 inches; a foot; a yard.
4. How long is this book? Your slate? How wide?
5. How long is your desk? How wide? How high?
6. How many feet long is the school-room? How many yards?
7. How many inches in 2 feet? A yard? $\frac{1}{2}$ yd.? $\frac{1}{3}$ yd.? $\frac{1}{4}$ yd.? 1.5 yd.?
8. How many yards in a rod? 2 rods? 3 rods? 4 rods? 5 rods? 7 rods? 10 rods? 72 inches? 48 inches?
9. How many rods in 11 yards? $16\frac{1}{2}$ yds.? 8 yds.? 20 yds.? 22 yds.? 30 yds.? 10 yds.?
10. How do you reduce inches to feet? in. to yds.? rds. to yds.? rds. to ft.? mi. to yds.? mi. to rds.? ft. to mi.? yds. to mi.?
11. In $\frac{1}{2}$ yd. how many ft.? How many in.? How many ft. and in.?

B

1. Add 6 rds. 4 yds. 1 ft. ; 10 rds. 5 yds. 1 ft. ; 5 rds. 2 yds. 2 ft. ; 7 rds. 3 yds. 1 ft.
2. 10 rds. 1 yd. 1 ft. 10 in. + 14 rds. 2 yds. 2 ft. 8 in. + 11 rds. 3 yds. 11 in. + 2 yds. 1 ft. 9 in.
3. From 2 rds. take 3 yds. 9 in.
4. From a rod take an inch.
5. From a mile take a foot.
6. In 34 rds. 4 yds. 2 ft. how many feet?
7. In 21 rds. 3 yds. 2 ft. 4 in. how many inches?
8. In 55 rds. 2 ft. how many inches?
9. In 6900 inches how many rods?
10. In 5342 feet how many rods?
11. In 376,985 inches how many miles?
12. Multiply 35 rds. 4 yds. by 28.
13. Divide 13 miles by 12, by 18, by 25, giving all denominations.
14. Multiply 73 mi. 450 yds. by 15.
15. Divide 99 mi. 1021 yds. by 47.
16. Value of $\frac{1}{4}$ of 1 mi. 215 yds.
17. Value of $\frac{1}{4}$ of a mile.
18. Value of $\frac{2}{3}$ of a mile.
19. From 8 mi. 35 rds. 2 yds. 1 ft. 8 in. take 4 mi. 88 rds. 2 yds. 2 ft. 6 in.

LXX.

A (Oral).

1. In half-a-mile how many rods? yards? feet?
2. How many rods in $\frac{1}{4}$ of a mile? $\frac{1}{5}$ mi.? $\frac{1}{6}$ mi.?
3. How many pieces of rope, 11 yards long, will stretch a mile?
4. At \$0.50 a rod, what will it cost to rope off a race course a quarter of a mile long?

5. A boy's stride is 2 ft. long. How many steps will he take in 50 yds.?

6. How many quarter-yards in $\frac{1}{4}$ of a mile?

7. Half-a-mile in 10 minutes. How many miles an hour?

8. 40 yards in half-a-minute. How many minutes to a mile?

9. A man walks 100 rods in 5 minutes. How long will he take to walk a mile?

10. How many inches in a rod?

B

1. A man's stride is 2 ft. 7 in. long. How many steps will he take in a mile?

2. If a man takes 2304 steps in a mile, what is the length of each stride?

3. How often will a wheel 2 yds. $1\frac{1}{2}$ ft. in circumference turn round in 3 miles?

4. With 3 rods of string how many parcels can I tie, if each requires 33 inches?

5. Divide 16 feet of string into ten parts, six of which shall be 2 in. longer than the other four.

6. 25 yards in half-a-minute. How many miles per hour?

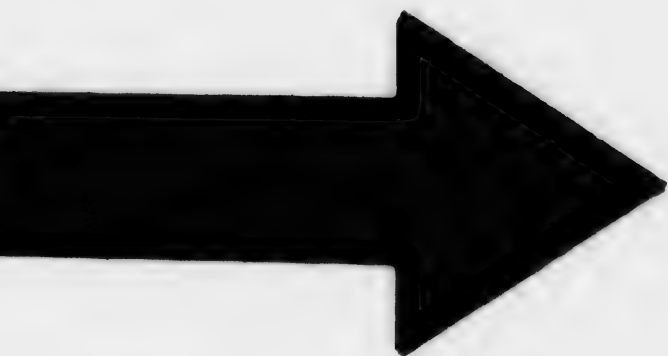
7. A boy has 2 mi. 345 yds. to walk to school from his home. How far will he walk in 26 days in going to and from school once a day?

8. If a man walk at the rate of 75 paces of 35 in. each per minute, how far will he walk in 8 hours?

9. A train runs 42 mi. 378 yds. in 1 hr. 56 min. What is the rate per minute?

10. At 60 cents a rod, how much should be paid for repairing a road 10 mi. 1650 yds. long?





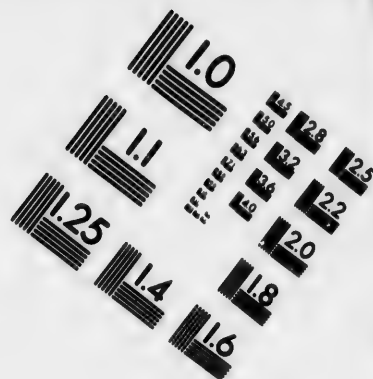
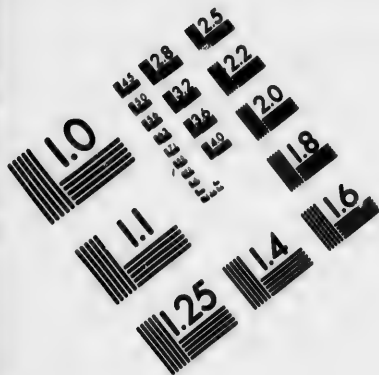
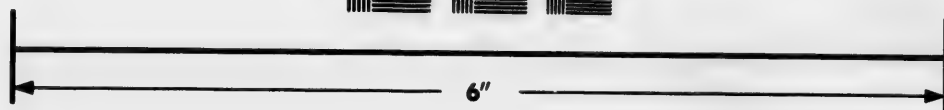
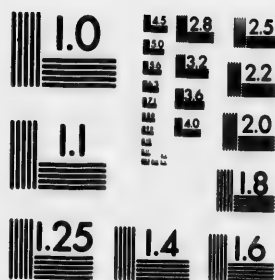


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16	17	18	19
20	21	22	23
24	25	26	27
28	29	30	31

SURFACE.

SQUARE MEASURE.

144	square inches (sq. in.)	=	1 square foot (sq. ft.)
9	square feet	=	1 square yard (sq. yd.)
30 $\frac{1}{2}$	square yards	=	1 square rod (sq. rd.)
160	square rods or 4840		
	square yards	=	1 acre (ac.)
640	acres	=	1 square mile (sq. mi.)

LXXI.

A (*Oral*).

1. For what purpose is Square Measure used?
2. How many denominations are there? Which is the greatest? Which the least?
3. How many sq. in. in a sq. ft.? In $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ of a foot?
4. How many sq. ft. make a sq. yd.? $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ of a sq. yd.?
5. How many sq. ft. and sq. in. in $\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ of a sq. yd.? Commit to memory.

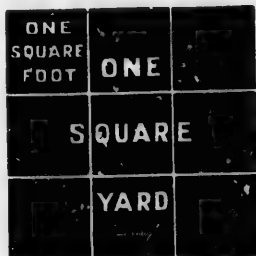
B

1. Reduce to lower denominations: 384 sq. rods, 85 sq. rods, 286 sq. rods, 4480 sq. rods, 5463 sq. rods.
2. Reduce to higher denominations: 5784 sq. yds., 6351 sq. yds., 3211 sq. yds., 1050 sq. yds., 3146 sq. yds.
3. Reduce 55 sq. yds. 4 ft. 110 in. to inches.
4. In 26,458 sq. in. how many yards?
5. Take 5 ac. 55 rds. 20 yds. from 6 ac. 10 rds. 11 yds.
6. Take 10 sq. rds. 10 sq. yds. 4 ft. 93 in. from 1 ac. 2 yds. 3 ft. 10 in.
7. Divide 100 acres into fields of 3 ac. 6 rds. each.
8. From $\frac{1}{4}$ of a square rod take $\frac{1}{8}$ of a sq. yard.

9. An estate consists of 375 ac. 101 rds. pasture, 84 ac. 5 rds. arable, and 291 ac. 150 rds. copse; of this 3 farms of 223 ac. 71 rds. each are let. How much remains unlet?

10. Find $\frac{1}{11}$ of 3 ac. 54 rds. 20 yds. 5 ft. 115 in.

LXXII.



3 rows, with 3 sq. ft. in each. 2 rows, with 3 sq. ft. in each.

A

1. What is a square? What is a rectangle? When is a rectangle a square?

2. Name ten things in the school-room that are rectangles.

3. Draw a square containing:—

- (a) 16 square feet. (4 rows of 4 sq. ft. each.)
- (b) 25 square feet. (5 rows of 5 sq. ft. each.)
- (c) 64 square inches. (8 rows of 8 sq. in. each.)

4. Draw a rectangle:—

- (a) 4 ft. long, 3 ft. broad, containing 12 sq. ft. (3 rows with 4 sq. ft. in each.)
- (b) 5 in. long, 4 in. broad, containing 20 sq. in. (4 rows with 5 sq. in. in each.)
- (c) 10 yards long, 2 yards broad, containing 20 sq. yds. (2 rows with 10 sq. yds. in each.)

(d) 6 inches long, $2\frac{1}{2}$ inches broad, containing 15 sq. inches. (2 rows with 6 inches in each, and one row of 6 half inches.)

5. The units of surface measure are obtained by squaring the units of linear measure.

Thus 144 sq. inches = (12×12) in.

9 sq. feet = (3×3) ft.

$30\frac{1}{4}$ sq. yards = $(5\frac{1}{2} \times 5\frac{1}{2})$ yds.

Draw diagrams illustrating these 3 cases, and show that 9 sq. ft. are not 3 linear ft. $\times$ 3 linear ft., but 3 times 3 sq. ft.

B (Oral).

1. A page of this book is 7 inches long and 5 inches wide. How many sq. inches are there in its surface?

2. A slate is 10 inches long and 8 wide. What is its surface measure?

3. What is surface measure usually called?

Ans. The area.

4. A blackboard is 18 ft. long and 3 ft. wide. Find its area.

5. The floor of a room is 20 ft. long and $10\frac{1}{2}$ ft. wide. Find its area.

6. The wall of a room is 6 yds. long and 9 ft. high. Find its area.

7. The sheet of a newspaper is 2 ft. long and 20 in. wide. Find its area.

8. A square table measures $3\frac{1}{2}$ feet each way. Find its area.

9. Find the area of your desk.

10. What two dimensions has a surface?

11. State briefly how to find area.

Ans. Area = length $\times$ breadth.

(Read the symbol = as "numerically equals.")

C (Oral).

1. There are 24 sq. ft. in the door of your schoolroom. The door is 3 ft. wide. How high is it? (*Draw plan.*)

2. A pane of glass contains 40 sq. inches. It is 8 inches long. How wide is it? (*Draw plan.*)

3. The area of a pane of glass is a sq. foot. It is 8 inches wide. How long is it?

4. A sheet of paper $7\frac{1}{2}$ inches wide contains 150 sq. inches. Find its length.

5. A lot of land having a frontage of 100 feet, contains 7500 sq. feet. Find its depth.

6. A pavement 7 feet wide is how long to contain 76 sq. yards?

7. A board containing 2 sq. feet is 8 inches wide. Find the length.

8. If there are 900 sq. feet in a floor which is 45 feet long, how wide is it?

9. A ceiling containing 12 sq. yds. is 9 ft. wide. How long is it?

10. How do you find length and breadth?

Ans. $Length = area \div breadth.$

$Breadth = area \div length.$

D

Find the areas of the three rectangles whose dimensions are given below, and draw a diagram to verify the result in each case:—

1. 4 ft. long, 3 ft. broad.

2. $1\frac{1}{2}$ ft. by $2\frac{1}{2}$ ft. 3. 2 ft. 3 in. by 2 ft. 6 in.

Find the number of sq. yds. in the following rectangles:

4. A room 24 ft. by 15 ft.

5. A hall $91\frac{1}{2}$ ft. by $36\frac{3}{4}$ ft.

6. A door 7 ft. 8 in. by 2 ft. 10 in.

- 7. A garden 58 yds. 2 ft. by 41 yds. 1 ft.
- 8. A carpet $14\frac{1}{2}$ ft. by $8\frac{1}{4}$ ft.
- 9. A table 16 feet square.

Find the length (or breadth) of the following rectangles:

- 10. A room whose area is 385 sq. ft. and width 17 ft. 6 in.
- 11. A floor whose area is $56\frac{1}{4}$ sq. yds. and width 18 ft. 9 in.
- 12. A ceiling whose area is 68 sq. yds. 8 sq. ft. 117 sq. in. and breadth 24 ft. 9 in.
- 13. A hall whose area is 92 sq. yds. $5\frac{1}{3}$ sq. ft., length $33\frac{1}{3}$ ft.
- 14. A lawn containing half an acre which is 121 yds. long.

E

- 1. How many acres are there in a field 1320 yds. long, 440 yds. wide?
- 2. How many acres in a rectangular tract of land $3\frac{1}{2}$ miles long by $2\frac{1}{4}$ miles broad?
- 3. An acre of land is cut up into 11 plots, each $27\frac{1}{2}$ yards long. What is the breadth of each plot?
- 4. A rectangular field whose length is 198 yds. contains $5\frac{1}{4}$ acres. Find its breadth.
- 5. How many sods, each $10\frac{1}{2}$ in. by $7\frac{1}{2}$ in. will be required to cover a piece of ground 25 yds. by 14 yds.?
- 6. A street contains $1\frac{1}{2}$ acres and is $\frac{3}{4}$ of a mile long. Find its breadth.
- 7. What wall surface will a roll of paper, 12 yds. long by 21 in. broad, cover?
- 8. An acre contains 160 sq. rods. Give the dimensions in rods (without using fractions) of five different rectangular lots of land, each of which will contain exactly one acre. Draw the plan of one of them.

LXXIII.

A (*Dimensions of a room.*)

1. What 2 dimensions must be multiplied together to give:—

- (a) The area of the floor?
- (b) The area of the ceiling?
- (c) The area of one of the two longer walls?
- (d) The area of one of the two shorter walls?

2. How would you find the total area of the four walls of a room?

Ans. *Area = (twice the length + twice the width) × the height.*

3. Give a shorter statement of the above.

Ans. *Area of four walls = perimeter of room × height.*

Find the area in sq. ft. of the four walls of the rooms whose dimensions are given below:—

4. Length, 26 ft. 6 in.; width, 17 ft. 6 in.; height, 10 ft.

5. Length, 24 ft. 7 in.; width, 20 ft. 5 in.; height, 7 ft. 4 in.

6. Length, 19 ft. 8 in.; width, 16 ft. 7 in.; height, 8 ft. 6 in.

7. Length, 25 ft. 4½ in.; width, 20 ft. 3½ in.; height, 11 ft. 3 in.

B (*Papering.*)

Find in yards the length of wall paper required for the rooms whose dimensions are given below:—

1. Room, 25 ft. by 17 ft., 12 ft. high; paper, 1 ft. 9 in. wide.

2. Room, 23½ ft. by 18½ ft., 11 ft. high; paper, 21 inches wide.

3. Room, 23 ft. 8 in. by 21 ft. 10 in., 10 ft. high; width of paper, 28 in.

4. Room, $39\frac{1}{2}$ ft. by $27\frac{1}{2}$ ft., $13\frac{1}{2}$ ft. high; paper, 25 inches wide.

Find the cost of papering the following rooms:—

5. Room, 27 ft. by 21 ft., 10 ft. high, paper, 2 ft. 6 in. wide, at 12 cents the yard.

6. Room, 29 ft. by 21 ft., 14 ft. high; paper, 21 in. wide, at 10 cents the yard.

7. Room, 27 ft. by 22 ft., $13\frac{1}{2}$ ft. high; paper, 21 in. wide, at 3 cents the yard.

8. Room, 24 ft. 6 in. by 20 ft. 6 in., 9 ft. 9 in. high; paper $29\frac{1}{4}$ inches wide, at 8 cents the yard.

LXXIV. (*Carpeting.*)

A (*Oral.*)

1. A floor is 10 ft. by 9 ft. How many widths of carpet will be required to cover it, (a) if the strips run lengthwise and are 3 feet wide; (b) if the strips run across the room and are 2 ft. wide? Draw a plan showing number of widths required in each case.

2. A floor 12 feet long by 10 feet wide is to be covered with carpet $2\frac{1}{2}$ feet wide. (a) Which way should the strips run so that nothing may be lost? (*Draw plan.*) (b) How many widths of carpet will be required? (c) How many yards in each strip? (d) How many yards to cover the floor? (e) Cost of carpet at \$1.50 a yard?

3. A floor is 16 ft. long by 11 ft. wide, and is to be covered with carpet a yard wide. (a) If the strips are laid lengthwise, how many will be required and how much carpet will be turned under? (b) If the strips are laid across the room, how many will be required and how much carpet will be turned under? (c) Which plan gives least waste? (d) What will be saved by adopting the better plan, if the carpet is worth \$1.50 a yard?

4. Find the number of yards of carpet, $\frac{3}{4}$ of a yard wide, required to cover most economically floors having the following dimensions:—

- (a) 6 yards long by 4 yards wide.
- (b) 5 yards long by 8 feet wide.
- (c) 10 feet square.
- (d) 14 feet long by 9 feet wide.

B

1. Find the cost of carpeting a room 24 feet by 18 feet, with carpet 2 ft. 3 in. wide at \$1.20 a yard, if the strips run lengthwise.

2. Find the cost of carpeting a room 22 ft. 6 in. by 19 ft. 4 in., with carpet 30 inches wide at \$1.50 a yard, if the strips run across the room.

3. Find the cost of carpeting a room 31 ft. 2 in. by 20 ft. 3 in., with carpet 33 inches wide at \$2.50 a yard, if the strips run across the room.

4. Cost of carpet $\frac{5}{8}$ yard wide, at \$1.00 a yard, for a room 18 ft. by 14 ft., (a) if the strips run lengthwise; (b) if the strips run across the room.

5. Which is the more economical way of laying a carpet $\frac{3}{4}$ yard wide on a floor 25 yds. by 20 yds.? How many yards of carpet will be saved by using it?

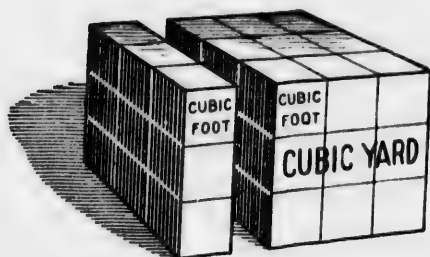
6. A rug, 18 ft. by 12 ft. 6 in., is laid down in a room 20 ft. by 13 ft. 9 in. Find the cost of staining the border of the room at \$0.18 a sq. yard.

7. A room is 12.5 ft. long, 8.75 ft. wide and 9.875 ft. high. (a) How many square yards in the walls, floor and ceiling together? (b) Find the cost of plastering the walls and ceiling at \$0.25 a sq. yd.; and of covering the floor with tiles nine inches square at 15 cents each.

COMPOUND QUANTITIES.

VOLUME OR SOLIDS.

CUBIC MEASURE.



$$1728 \text{ cubic inches (cu. in.)} = 1 \text{ cubic foot (cu. ft.)}$$

$$27 \text{ cubic feet} = 1 \text{ cubic yard (cu. yd.)}$$

The units of volume are cubes of the linear units.

$$1728 \text{ cu. in.} = (12 \times 12 \times 12) \text{ inches.}$$

$$27 \text{ cu. ft.} = (3 \times 3 \times 3) \text{ feet.}$$

Show from the above figure that a cubic yard contains 27 cubic feet.

LXXV.

A (*Oral*).

1. For what purpose is cubic measure used?
2. What three dimensions has a solid?
3. What is a cube? What is a rectangular solid?
4. How do you find the content or volume of a cube or a rectangular body?
5. Give a brief statement for this.

Ans. *Cubic content = length $\times$ breadth $\times$ thickness.*

6. If the cubic content and two dimensions are given, how may the third dimension be found?

Ans. *By dividing the cubic content by the product of the two given dimensions.*

B

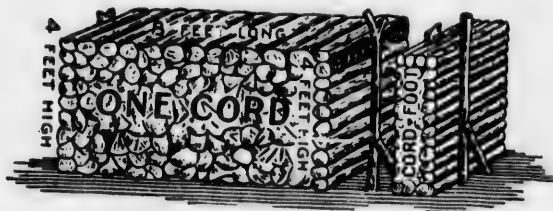
Find the cubic content of the five following:—

1. A box 4 ft. long, 2 ft. broad, 1 ft. high.
2. A block 4 in. long, 3 in. wide, 5 in. high.
3. A stone pedestal 4 ft. 6 in. long, 3 ft. 4 in. broad, 1 ft. 4 in. high.
4. A room 10 yds. long, 16 ft. broad, 8 ft. 6 in. high.
5. A cube whose edge is $4\frac{1}{2}$ feet.
6. How many loads of earth, each a cubic yard, must be removed in digging a cellar $21\frac{1}{2}$ ft. long, $20\frac{1}{2}$ ft. broad, and $9\frac{1}{2}$ ft. deep?
7. Find the height of a room 19 ft. 4 in. long, 18 ft. broad, cubic content 3045 cu. ft.
8. Find the surface measure of a cistern whose cubic content is 1855 cu. ft. and depth 8 ft. 10 in.
9. Find the cost of digging a trench 153 yds. long, 6 ft. broad, and 4 ft. deep, at 30 cents a cubic yard.
10. Find the cost of a cube, whose edge measures $2\frac{1}{2}$ inches, at 20 cents the cubic inch.
11. How many cubic feet of water in a cistern whose three dimensions are each one yard?
12. What will be the weight in cwt., etc., of the water in such a cistern (Ex. 11) when a cubic foot of water weighs 1000 ounces?
13. A cubic foot of ice weighs 57 lbs. 6 oz. Find the cubic content of a ton.
14. A bin is 12 ft. 6 in. long, 5 ft. wide, and 4 ft. deep:—(a) Find its cubic content. (b) How many bushels of wheat will it contain if a bushel measures 2150·42 cubic inches? (c) What will be the weight of the wheat if a bushel weighs 60 lbs.? (d) What will be the value of the wheat at \$0.60 a bushel?

C

1. Reduce 3,499,200 cu. in. to cu. yds.
2. Reduce 8 cu. yds. 17 cu. ft. to cubic inches.
3. Reduce $\cdot 7$ of a cubic yard to cubic feet and inches.
4. From 562 cu. yds. 678 cu. in. take 47 cu. yds. 24 cu. ft. 1069 cu. in.
5. Multiply 8 cu. yds. 23 cu. ft. 514 cu. in. by 83.
6. Divide 454 cu. yds. 6 cu. ft. by 84.
7. How often are 648 cu. in. contained in 38 cu. yds.?
8. Divide 2 cu. yds. 20 cu. ft. 100 cu. in. by $2\frac{1}{3}$.

WOOD MEASURE.



A cord of wood is a pile 8 feet long, 4 feet wide, 4 feet high. A cord foot is one foot in length of such a pile.

$$16 \text{ cubic feet} = 1 \text{ cubic foot}$$

$$8 \text{ cord feet} = 1 \text{ cord.}$$

LXXVI.

A (Oral).

1. How many cubic feet in a cord? $\frac{1}{2}$ cord? $\frac{3}{4}$ cord? $\frac{5}{8}$ cord? A cord foot? 6 cord feet? $3\frac{1}{2}$ cord feet? $7\frac{1}{2}$ cord feet?
2. How many cord feet in 32 cu. ft.? 48 cu. ft.? 100 cu. ft.? 4 cords? $6\frac{1}{4}$ cords? $10\frac{3}{4}$ cords?
3. What part of a cord is a cord foot? 2 cord feet? 5 cord feet? 8 cubic feet? 64 cu. ft.? 32 cu. ft.?

4. A pile of wood is 4 ft. long, 4 ft. wide, 4 ft. high.
How many cu. ft. ? Cord feet ? Cords ?

5. A pile of wood is 4 ft. long, 2 ft. wide, 3 ft. high.
How many cu. ft. ? Cord feet ? Cords ?

B

1. How many cords of wood in a pile 40 feet long, 4 feet wide, and 6 feet high ?

2. How many cords of wood in a pile 28 feet long, 8 feet wide, and 5 feet high ?

3. What must be the length of a pile of wood $4\frac{1}{2}$ feet wide and 5 feet high to contain 10 cords ?

4. What is the worth of a pile of wood 4 ft. in height, 6 ft. in length, and $3\frac{1}{2}$ ft. in width, at \$4.50 a cord ?

5. At \$4.25 a cord, what will a pile of wood 2 rods long, 4 ft. wide, and 4 ft. high, cost ?

MISCELLANEOUS.**NUMBER.**

12 units	=	1 dozen.
12 dozen	=	1 gross.
20 units	=	1 score.

PAPER.

24 sheets	=	1 quire.
20 quires	=	1 ream.

LENGTH.

4 inches	=	1 hand.
6 feet	=	1 fathom.

LXXVII.

1. How many sheets in 3 quires ? 4 quires ? $\frac{1}{2}$ quire ?
 $\frac{3}{4}$ quire ? $\frac{2}{3}$ quire ? $\frac{5}{8}$ quire ?

2. Cost of a ream of paper at 2 sheets for a cent ?

3. How many sheets in a ream? $\frac{1}{2}$ ream? $\frac{3}{4}$ ream?
4. At \$3 a ream, what will 5 quires of paper cost? $2\frac{1}{2}$ quires? 4 dozen sheets?
5. How many reams in 960 sheets?
6. I buy paper at \$2.50 a ream, and sell it at 3 sheets for 2 cents. What do I gain?
7. At 15 cents a quire, how much for 5 reams?
8. How many dozen and how many score in 600 eggs? In 480 oranges? In 1000 oysters? In 3600 pencils?
9. Find the difference between 9 dozen and 5 score? 8 dozen and 3 score? 6 dozen and a gross? 15 score and $2\frac{1}{2}$ gross? Six dozen dozen and half-a-dozen dozen?
10. How many boxes will contain 5 gross of pencils, if 4 dozen are put in each box?
11. A factory turns out 60 dozen pairs of shoes a day. How many gross in a week (6 days)?
12. What is the height (*a*) in feet, (*b*) in inches of a horse that measures 12 hands? $13\frac{1}{2}$ hands? 14 hands? 15 hands? $16\frac{1}{2}$ hands?
13. A ship nearing land sounds the depth of water every quarter of an hour. Four soundings give 100 fathoms, 88 fathoms, 66 fathoms and 55 fathoms respectively. Express the depth of water found by these soundings (*a*) in feet, (*b*) in yards.

REVIEW.

A (*Oral*).

1. Two dozen pears at 3 for 5 cents?
2. Difference between 8 feet square and 8 sq. ft.?
3. A lot containing 10 ac. is 40 rods long. How wide?
4. A cwt. of sugar at a cent per oz.?

5. How many dollars in £15 (rough estimate)?
6. How many dollars in £10 (exact value)?
7. How many cents in 3s. (both methods)?
8. Two gross of pens at 5 cents a dozen?
9. 250 oysters at 70 cents a hundred?
10. A brick is 2 by 4 by 8 inches. Find its solidity.
11. If a can holds $1\frac{1}{3}$ pints, how often will a gallon fill it?
12. How many baskets, holding $1\frac{1}{2}$ pecks each, will 3 bushels of potatoes fill?
13. At \$10 a week what will a person's board for 5 days come to?
14. A ream of paper at 50 cents for 4 quires?
15. 6 bushels at \$0.20 a peck?
16. 3 gross at \$6 for 288?
17. From 100 take 8 dozen.
18. In May and June how many half days?
19. Divide $\frac{1}{3}$ of 1095 by 3.
20. $1.15 \div .5$.
21. Take .005 from .05.
22. .12 of a lb. cost \$0.60. What will $\frac{1}{3}$ lb. cost?
23. What is .15 of \$4?
24. Divide $.17 + .03$ by 2.
25. $\frac{3}{8}$ of half a pound.
26. $\frac{3}{8}$ of half an acre.
27. $\frac{1}{4}$ of a ton.
28. $\frac{7}{10}$ of 2 minutes.
29. .5 of a lb. + .75 of 12 oz.
30. Express .16 as a common fraction.
31. 6.8 tons coal at \$6.50 a ton?
32. May 1 is Monday. What day of the week is June 1 following?

33. What is your age in years, months and days?
34. 20 miles in $2\frac{1}{2}$ hours. How many miles an hour?
35. 20 miles in $2\frac{1}{2}$ hours. How long to go a mile?

B

1. Out of a £500 bank note I paid £17. 15s.; £8 12s. 6d.; £31. 4s. 8½d.; £9. 16s. 0¾d.; £56. 0s. 11½d.; £245. 19s. 7d.; £7. 13s. 9¾d.; and 18s. 10d. How much had I left?
2. A grocer bought for \$45 half a ton of sugar, which he afterwards sold at 6¼ cents a lb. How much did he gain or lose?
3. How many shirts, each requiring $3\frac{1}{2}$ yards, can be made out of 5 pieces of linen, the length of each piece being 91 yards?
4. A baker sells 600 four-pound loaves daily. What extra profit will he realise in a week of 6 days by raising the price of his bread $\frac{1}{2}$ cent per lb.?
5. How many times is .075 of a dozen contained in .75 of a score.
6. How much would be obtained from 536 subscribers if each contributed a five-dollar bill, a dollar bill, a fifty-cent piece, a quarter and a five-cent piece?
7. How often does the pendulum of a clock vibrate in 5 dys. 17 hrs., the number of vibrations being 60 per minute?
8. How many steps does a person take in walking 7 miles, the length of each step being 2 ft. 7½ in.?
9. A gentleman whose income is \$2500 a year spends on an average \$5.66⅔ a day. What is his annual saving?
10. A farmer bought a cow for \$60. In what time did he get back this amount by selling 6 gallons of her milk daily at 5 cents a quart?

11. I bought 360 eggs at the rate of 2 for a cent, and 240 more at the rate of 3 for a cent; I afterwards sold all the eggs at the rate of 5 for 2 cents. How much did I gain or lose?

12. Cost of 17 lbs. of mutton at $11\frac{1}{2}$ d. a lb.

13. What distance does a wheel pass over in 3232 revolutions, the circumference of the wheel being 2 yds. 2 ft. 3 in.?

14. How many lots, each containing 1 acre 10 sq. rds., can be formed out of 189 acres?

15. What is the difference in area between a space 5 yards square and a space containing 5 square yards?

16. Find the number of minutes in the quarter comprising February, March and April, 1896.

17. By how much does the sum of 12 yds. 2 ft. $4\frac{1}{2}$ in. and 8 yds. 1 ft. $5\frac{1}{2}$ in. exceed the sum of 5 yds. 2 ft. $11\frac{1}{2}$ in. and 6 yds. $9\frac{1}{2}$ in.?

18. How many lbs. of beef at $10\frac{1}{2}$ cents a lb. would be equivalent to 43 lbs. mutton at 8 cents a lb.?

19. How long would you be counting a million of cent pieces at the rate of 50 a minute?

20. If the price of a sq. inch of gold leaf is $3\frac{1}{2}$ cents, what will 26 sq. yards cost?

21. Price of a bushel of nuts at 21 cents a pint?

22. How many bottles, each holding a pint and a half, could be filled from a cask containing 57 gallons?

23. When candles are sold at 19 cents a lb. how much would 4480 cost, every 8 candles weighing a lb.?

24. How many pears at $2\frac{1}{2}$ d. each should be given in exchange for 15 dozen oranges at $1\frac{1}{2}$ d. each?

25. Price of 10 reams 16 quires of paper at $\frac{1}{4}$ cent a sheet?

26. Price of 7 tons of straw at 21 cents a stone (14 lbs.)?

27. How many revolutions will a wheel, $7\frac{1}{2}$ feet in circumference, make in going a mile?
28. How many times is $\cdot75$ of an inch contained in $\cdot875$ of a yard?
29. If the 1st of April is a Monday, on what day of the week will Christmas fall that year?
30. How many sq. ft. of boards will it take to make a tight fence 8 feet high round a rectangular lot 14 rods long and 40 yards wide?
31. A room 40 ft. long, 20 ft. broad and 12 ft. high cost \$60 to paper. Find the cost of papering one 30 ft. long, 20 ft. broad and 10 ft. high.
32. $\cdot125$ of a farm is hill and $\frac{3}{10}$ is woodland; the rest 99 acres is arable. Find the size of the farm.
33. A careless pupil copies $\cdot07$ of \$245.16 instead of $\cdot7$. What is the amount of his error?
34. What is the content of a block of stone whose length is 5 ft. 9 in., and breadth and thickness each 3 ft.?
35. A box 1 ft 3 in. long, 11 in. deep and 13 in. wide. What will it cost to cover its six sides with gold leaf at $2\frac{1}{2}$ cents a square inch?
36. The side of a square room measures 16 ft. 6 in. How many yards of carpet 33 in. wide will be required to cover it?
37. A rectangular field contains 5 acres, and one side is $302\frac{1}{2}$ yards long. How long is the other?
38. Dominion Square, Montreal, is 390 yds. long and 125 yds. wide. How many acres does it contain?
39. Measure by pacing the frontage and depth of your school lot. Calculate its size (a) in sq. yards, (b) in sq. rods, (c) in acres or the fraction of an acre.
40. How many yards of fencing would be needed to enclose the lot?

CHAPTER VI.

RAPID ARITHMETIC.

LXXVIII.

DRILL EXERCISES TO SECURE ACCURACY AND RAPIDITY
IN WORKING FRACTIONS.

A	B	C	D	E
$\frac{1}{2}$	$\frac{2}{3}$	$1\frac{1}{2}$	2	16
$\frac{3}{4}$	$\frac{4}{5}$	$3\frac{1}{3}$	5	29
$\frac{5}{8}$	$\frac{6}{9}$	$4\frac{4}{5}$	7	24
$\frac{7}{9}$	$\frac{9}{10}$	$3\frac{3}{4}$	3	45
$\frac{7}{6}$	$\frac{11}{12}$	$2\frac{1}{12}$	9	100

1. Add each fraction under A separately to each fraction under B. (25 examples.)
2. Add each fraction under A separately to each mixed number under C. (25 examples.)
3. From each whole number under D take separately each fraction under A. (25 examples.)
4. Find separately the difference between each fraction under A and each fraction under B. (25 examples.)
5. From each mixed number under C take separately each fraction under B.
6. Multiply each fraction under B separately by each whole number under D.
7. Multiply each number under E separately by each fraction under A, using the sign "of." ($\frac{1}{2}$ of 16, etc.)
8. Multiply each number under E separately by each mixed number under C.
9. Multiply each fraction under A separately by each fraction under B.
10. Divide each fraction under A separately by each whole number under D.
11. Divide each fraction under A separately by each fraction under B.
12. Divide each mixed number under C separately by each fraction under B.

LXXIX.

DRILL EXERCISES TO SECURE ACCURACY AND RAPIDITY
IN THE SIMPLE RULES.

A

1. Count separately by *sixes, sevens, eights, nines*, starting at 0, till the sum reaches 100.
2. Count separately by *sixes, sevens, eights, nines*, starting at 1, till the sum reaches 100.

3. Count separately by *sixes, sevens, eights, nines*, starting at 2, till the sum reaches 100.

4. Count separately by *sixes, sevens, eights, nines*, starting at 3, till the sum reaches 100.

5. Count separately by *sixes, sevens, eights, nines*, starting at 4, till the sum reaches 100.

6. Count separately by *sixes, sevens, eights, nines*, starting at 5, till the sum reaches 100.

B

1. Subtract *twos* (*a*) from 100, (*b*) from 99 continually till the remainder is less than 2.

2. Subtract *threes* (*a*) from 100, (*b*) from 99, (*c*) from 98 continually till the remainder is less than 3.

3. Subtract *fours* (*a*) from 100, (*b*) from 99, (*c*) from 98, (*d*) from 97 continually till the remainder is less than 4.

4. Subtract *fives* (*a*) from 100, (*b*) from 99, (*c*) from 98, (*d*) from 97, (*e*) from 96 continually till the remainder is less than 5.

C (Oral).

1. From 100 take:—

11	23	35	47	59	21	32	53	74	95
92	84	76	68	29	48	67	86	12	24
36	45	60	13	31	14	41	17	71	80
42	54	19	33	71	58	7	18	26	43.

2. 90 - 35. 40 - 13. 70 - 28. 80 - 37. 50 - 24.
 90 - 25. 50 - 27. 60 - 33. 60 - 47. 70 - 45.
 90 - 27. 80 - 16. 80 - 49. 90 - 32. 70 - 52.
 80 - 43. 60 - 48. 50 - 19. 30 - 14. 70 - 58.

3. 95 - 66. 52 - 26. 86 - 57. 73 - 38. 81 - 49.
 95 - 47. 94 - 57. 83 - 26. 72 - 48. 91 - 64.
 75 - 48. 94 - 58. 63 - 29. 75 - 29. 74 - 37.
 92 - 68. 81 - 56. 75 - 38. 71 - 56. 81 - 27.

RAPID ARITHMETIC.

4. 42 + 19.	71 + 29.	65 + 28.	29 + 64.	19 + 83.
26 + 47.	18 + 79.	38 + 55.	17 + 92.	35 + 86.
16 + 35.	23 + 68.	35 + 75.	89 + 97.	47 + 63.
77 + 35.	69 + 40.	49 + 83.	98 + 84.	57 + 63.
43 + 37.	57 + 16.	56 + 94.	68 + 93.	88 + 39.
38 + 31.	45 + 82.	19 + 21.	52 + 49.	48 + 39.
19 + 92.	75 + 21.	17 + 84.	35 + 54.	29 + 83.

D (Oral).

20	30	40	50	60	70	80	90	32	62
47	53	54	87	63	96	78	58	86	89
65	36	74	66	89	95	66	59	48	75
38	14	26	37	17	19	57	83	28	25.

1. Multiply each of the above numbers separately by 2, by 3, by 4, by 5, by 6, by 7, by 8, by 9.

2. Multiply each of the above numbers separately by 20, by 50, by 25, by 80.

3. Find the cost of articles represented by the above numbers at the following prices:—

\$0.50 each.	\$0.10 each.	\$0.33 $\frac{1}{3}$ each.	\$0.08 $\frac{1}{4}$ each.
\$0.25 "	\$0.05 "	\$0.16 $\frac{2}{3}$ "	\$0.75 "
\$0.20 "	\$0.15 "	\$0.12 $\frac{1}{2}$ "	\$1.50 "

E (Oral).

1.	39	48	42	60	45	63	72	81	75	69	84
							÷ 3.				
2.	52	60	72	56	64	76	68	84	92	88	96
							÷ 4.				
3.	70	65	85	95	80	75	100	125	140	115	
							÷ 5.				
4.	72	84	96	90	78	108	120	102	126	144	
							÷ 6.				

5. 98 112 105 133 147 119 140 91 126 161

÷ 7.

6. 112 128 114 120 136 152 176 200 184 192

÷ 8.

7. 117 135 153 144 180 171 162 197 225 207

÷ 9.

F (*Oral*).

Break into prime factors:—

8	9	12	14	15	16	18	20	21	22	24	25
26	27	28	30	32	33	35	36	40	42	44	45
48	49	50	54	56	60	63	64	65	60	70	72
75	80	81	77	85	88	90	99	100	108	121	144

G

1	2	3	4	5	6
3215	707	37141	9876	2134	3724
376	6999	909	34905	56789	41596
10975	521	7787	99589	4021	247
208	7	4005	87654	369	89076
909	35	92198	15009	84617	3942

Add, then subtract the largest number in each example from the sum; multiply the remainder by 6, and divide the product by 7.

7	8	9	10	11	12
705	9215	92564	95664	42672	91792
3565	37605	310004	2965	3724	3794
759	9521	29995	59699	102	58
4295	8763	3997	8785	97931	149762
51967	1925	10009	3976	8415	37946

Add, then subtract the largest number in each example from the sum; multiply the remainder by 7 and divide the product by 8.

13	14	15	16	17	18
3285	72564	23	4620	4379	309542
4791	3785	936	973	6873	876
381	23584	6543	25	459209	54093
51028	987	92840	9	376	7777
61234	96	72104	17	96587	8654976

Add, then subtract the largest number in each example from the sum; multiply the remainder by 8, and divide the product by 9.

19	20	21	22	23	24
23504	358	56789	123456	46984	466779
4368	9246	3587	258071	36481	878987
25	14376	296	589347	597645	365363
9	845	89	258923	986778	432698
36	29	7	720145	79666	756545
378	7	12345	396012	85859	487988

Add, then subtract the largest number in each example from the sum; multiply the remainder by 11 and divide the product by 12.

H

1. Multiply 92684 by 625, 750, 375, 225, 175.
2. " 48211 by 168, 324, 8016, 968, 847.
3. " 79382 by 8811, 819, 963, 567, 497.
4. " 8729 by 36186, 4080, 13212, 84213.
5. " 47291 by 324, 486, 546, 427, 5490.
6. " 721306 by 12500, 625, 750, 8125.
7. Divide 3721690 by 57, 89, 990, 119, 510.
8. " 596802 by 87, 1002, 1100, 5760, 218.
9. " 472169 by 5900, 1875, 16230, 11090, 512.
10. " 51980631 by 19890, 3735, 6620, 975, 448.
11. " 11021031 by 2997, 1268, 115700, 6938.

Add vertically and horizontally the following:—

$$\begin{array}{r}
 1. \quad 4768 + 2578 + 7654 + 5893 + 1468 = \\
 \quad 8996 + 6259 + 3486 + 4687 + 2579 = \\
 \quad 6989 + 8346 + 9563 + 2763 + 3456 = \\
 \quad 9798 + 2794 + 8279 + 7498 + 1379 = \\
 \quad 8959 + 8327 + 6724 + 7162 + 4268 = \\
 \quad 7246 + 5168 + 8351 + 2748 + 7913 = \\
 \quad 8546 + 3745 + 4627 + 5398 + 2405 = \\
 \quad 8989 + 2389 + 9136 + 2875 + 6372 = \\
 \hline \hline
 \end{array}$$

$$\begin{array}{r}
 2. \quad \$43.58 \quad \$82.73 \quad \$56.84 \quad \$50.25 \quad \$66.60 \quad \$75.84 = \\
 \quad 62.49 \quad 99.88 \quad 79.83 \quad 60.43 \quad 74.83 \quad 93.62 = \\
 \quad 58.73 \quad 88.77 \quad 42.61 \quad 7.00 \quad 83.97 \quad 71.56 = \\
 \quad 45.62 \quad 46.54 \quad 15.00 \quad 19.73 \quad 46.52 \quad 43.94 = \\
 \quad 91.58 \quad 73.62 \quad 94.68 \quad 47.62 \quad 80.75 \quad 16.18 = \\
 \quad 47.63 \quad 81.94 \quad 43.72 \quad 84.75 \quad 91.94 \quad 17.15 = \\
 \hline \hline
 \end{array}$$

$$\begin{array}{r}
 3. \quad 5\frac{9}{20} + 17\frac{11}{12} + 425\frac{3}{4} = \quad 4. \quad \frac{19}{21} + \frac{3}{8} + \frac{1}{6} = \\
 \quad 8\frac{3}{8} + 14\frac{17}{24} + 860\frac{3}{4} = \quad \quad \frac{5}{6} + \frac{13}{18} + \frac{8}{9} = \\
 \quad 7\frac{4}{5} + 17\frac{5}{6} + 107\frac{7}{15} = \quad \quad \frac{2}{7} + \frac{7}{6} + \frac{3}{8} = \\
 \hline \hline
 \end{array}$$

$$\begin{array}{r}
 5. \quad 3\frac{1}{4} + 15\frac{1}{3} + 1\frac{2}{5} + 18\frac{7}{8} = \quad 6. \quad \frac{7}{12} + \frac{3}{4} + \frac{5}{8} + \frac{3}{5} = \\
 \quad 7\frac{5}{8} + 18\frac{6}{12} + 7 + 12\frac{5}{6} = \quad \quad \frac{3}{4} + \frac{3}{5} + \frac{1}{2} + \frac{5}{6} = \\
 \quad 3\frac{7}{10} + 27\frac{1}{2} + 9\frac{4}{5} + 38\frac{5}{8} = \quad \quad \frac{1}{2} + \frac{7}{5} + \frac{3}{8} + \frac{7}{10} = \\
 \quad 6\frac{9}{10} + 24\frac{1}{5} + 8\frac{1}{3} + 17\frac{7}{12} = \quad \quad \frac{4}{5} + \frac{11}{12} + \frac{5}{12} + \frac{11}{15} = \\
 \hline \hline
 \end{array}$$

WEIGHTS AND MEASURES TABLES.

TIME.

60 seconds (sec.)	= 1 minute (min.)
60 minutes	= 1 hour (hr.)
24 hours	= 1 day (dy.)
7 days	= 1 week (wk.)
365 days	= 1 common year (yr.)
100 years	= 1 century (C.)

SURFACE.

144 square inches	=	1 square foot (sq. ft.)
9 square feet	=	1 square yard.
30 $\frac{1}{4}$ square yards	=	1 square rod.
160 square rods or		
4840 square yards	=	1 acre (ac.)
640 acres	=	1 square mile.

CAPACITY.

2 pints (pt.)	= 1 quart (qt.)
4 quarts	= 1 gallon (gal.)
2 pints (pt.)	= 1 quart (qt.)
8 quarts	= 1 peck (pk.)
4 pecks	= 1 bushel (bu.)

VOLUME.

1728 cubic inches	= 1 cubic foot.
27 cubic feet	= 1 cubic yard.
16 cubic feet	= 1 cord foot.
8 cord ft. or 128 cubic ft.	= 1 cord.

WEIGHT.

16 ounces (oz.)	= 1 pound (lb.)
100 pounds	= 1 hundred weight (cwt.)
20 cwt. or 2000 lbs.	= 1 ton.
12 units	= 1 dozen.
12 dozen	= 1 gross.
20 units	= 1 score.

MISCELLANEOUS.

24 sheets	= 1 quire.
20 quires	= 1 ream.
4 inches	= 1 hand.
6 feet	= 1 fathom.

ENGLISH MONEY.

4 farthings	= 1 penny (d.)
12 pence	= 1 shilling (s.)
20 shillings	= 1 pound (£.)

LENGTH.

12 inches (in.)	= 1 foot (ft.)
3 feet	= 1 yard (yd.)
5 $\frac{1}{2}$ yards	= 1 rod (rd.)
320 rods, 1760 yards	
or 5280 feet	= 1 mile (mi.)

TROY WEIGHT.

24 grains	= 1 pennyweight (dwt.)
20 dwt.	= 1 ounce.
12 ounces	= 1 pound.

LES.

ot (sq. ft.)

quare yard.

quare rod.

ere (ac.)

le.

hic foot.

hic yard.

oot.

= 1 cord.

n.

s.

e.

e.

n.

l.

om.

ht (dwt.)